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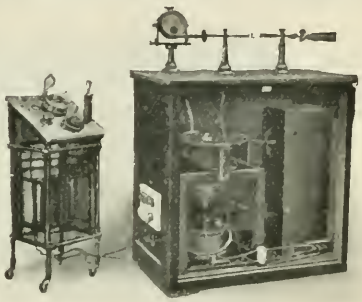

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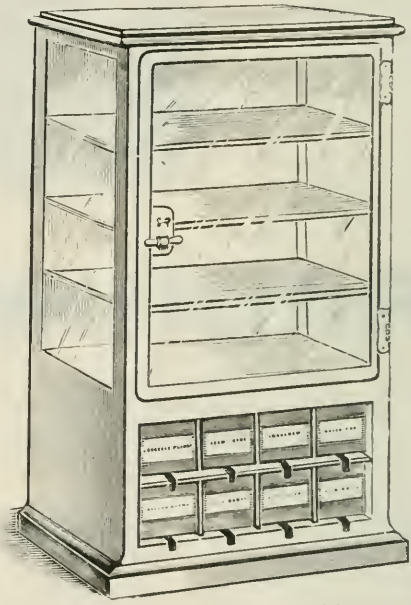

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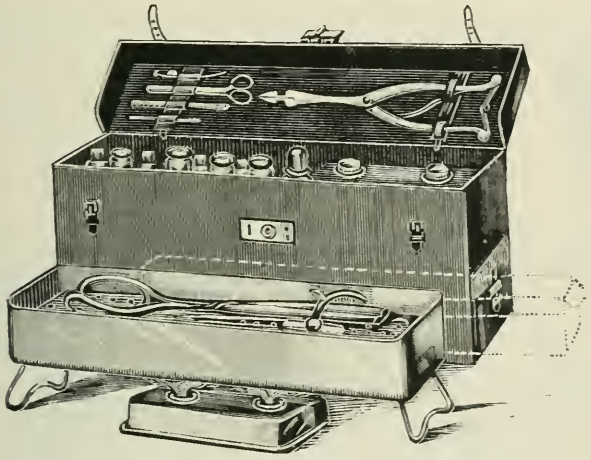

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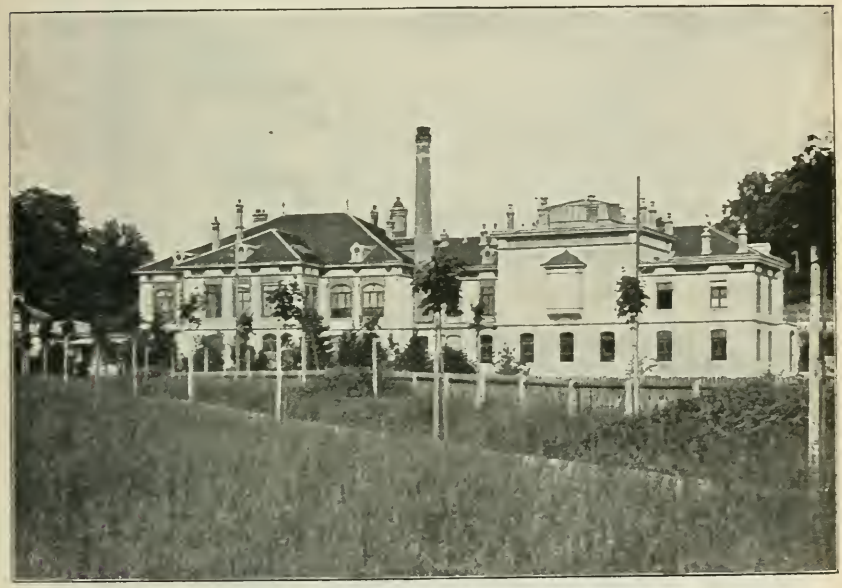

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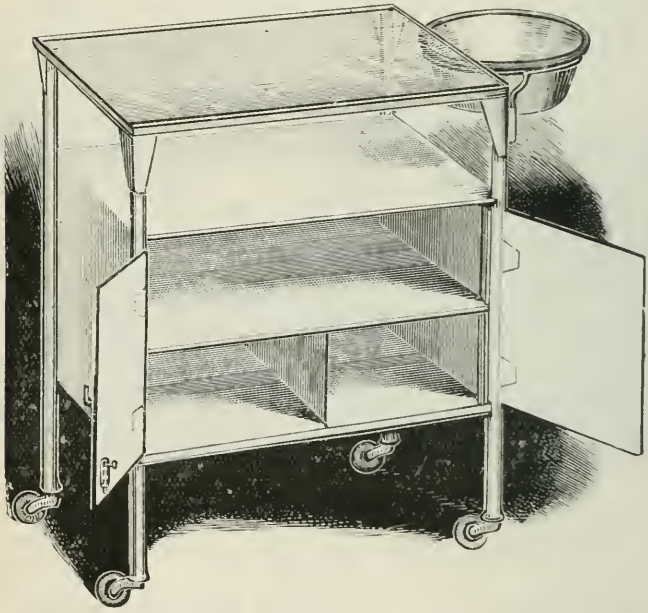

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Fig. 2.

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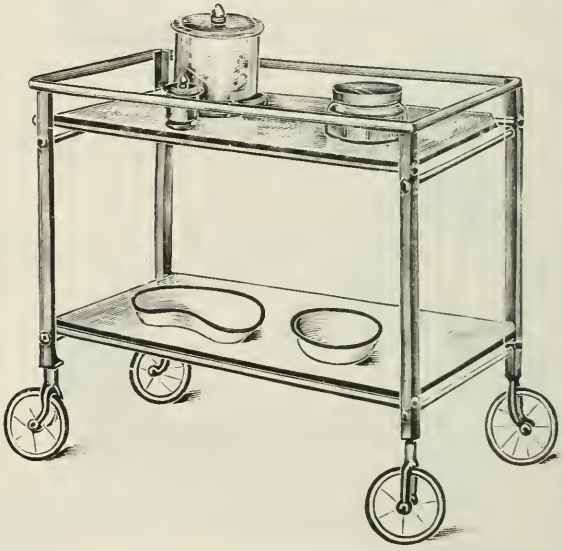

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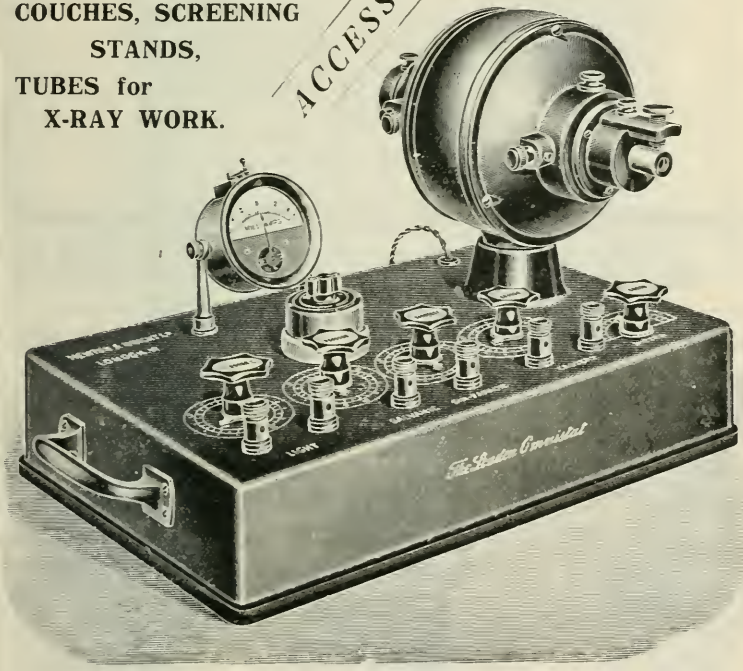

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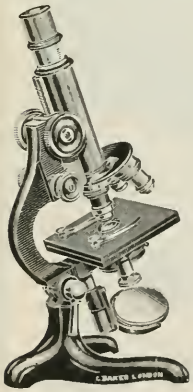

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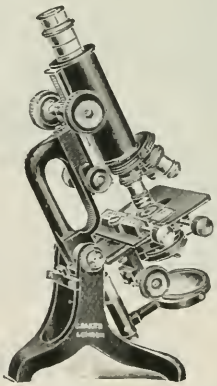

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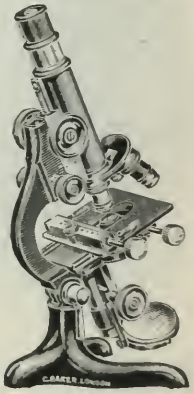

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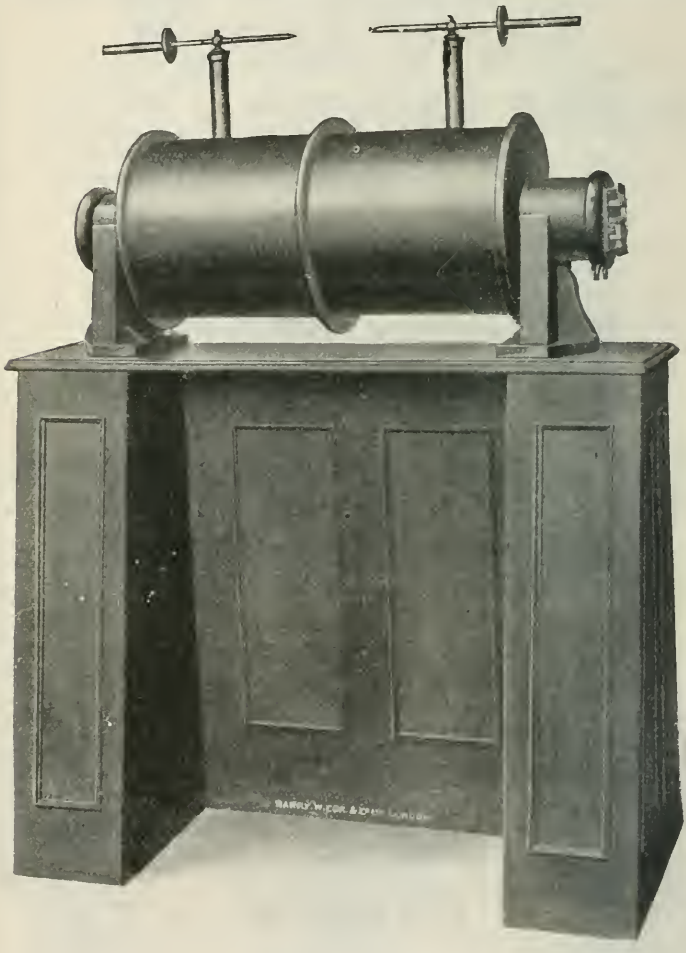

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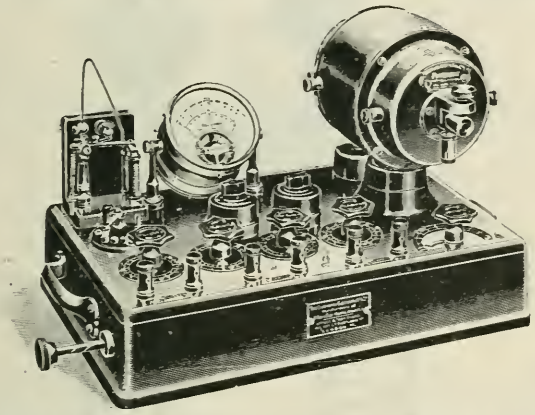

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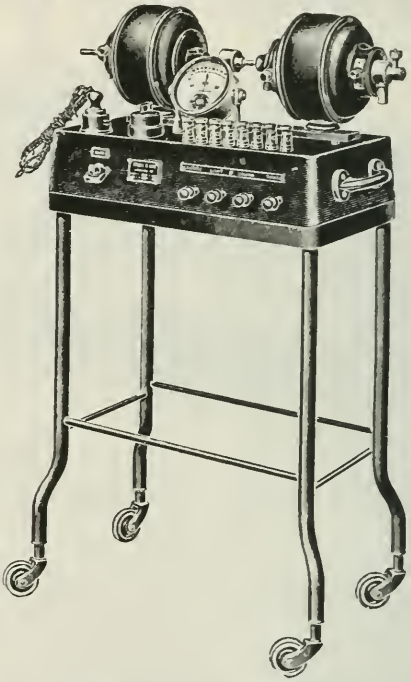

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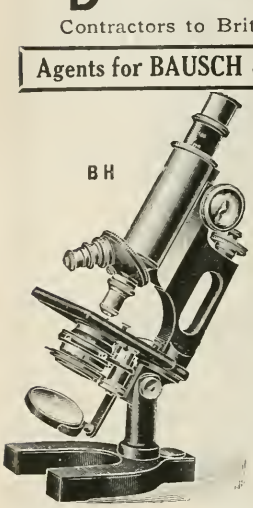

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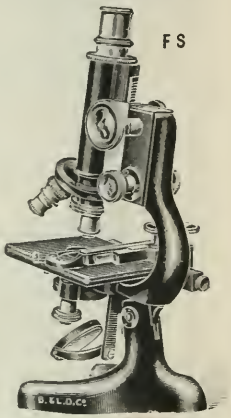

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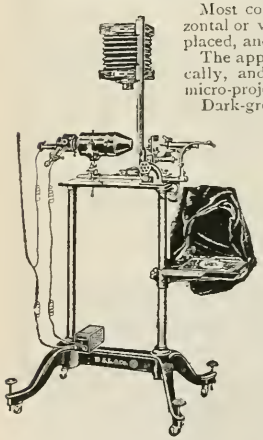

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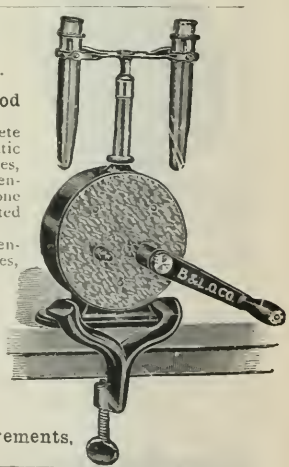

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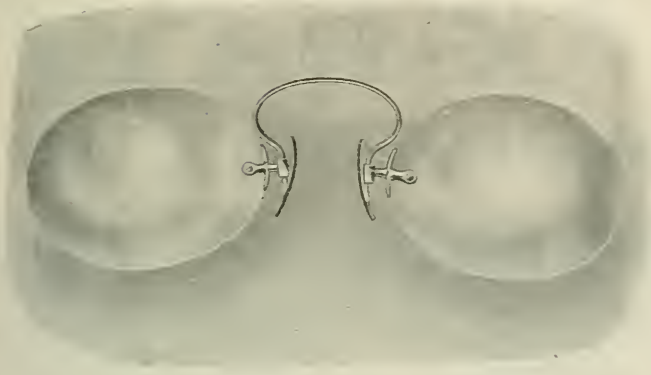

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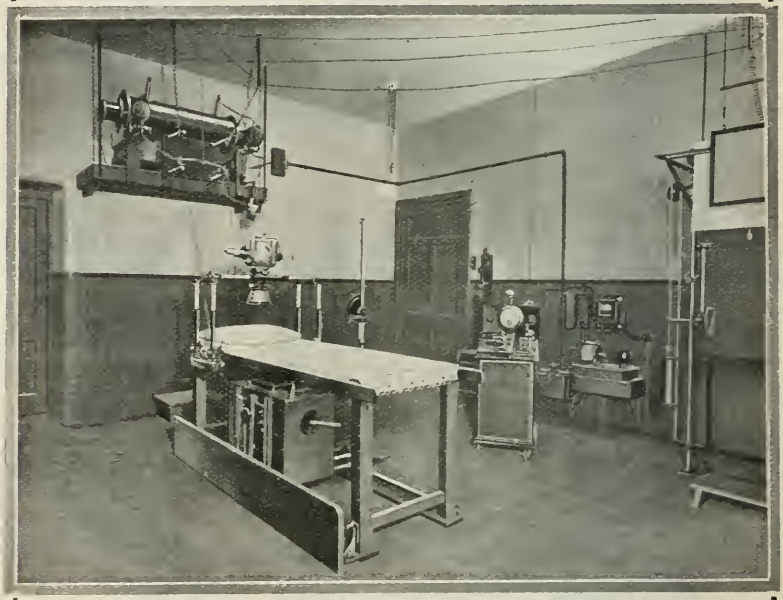

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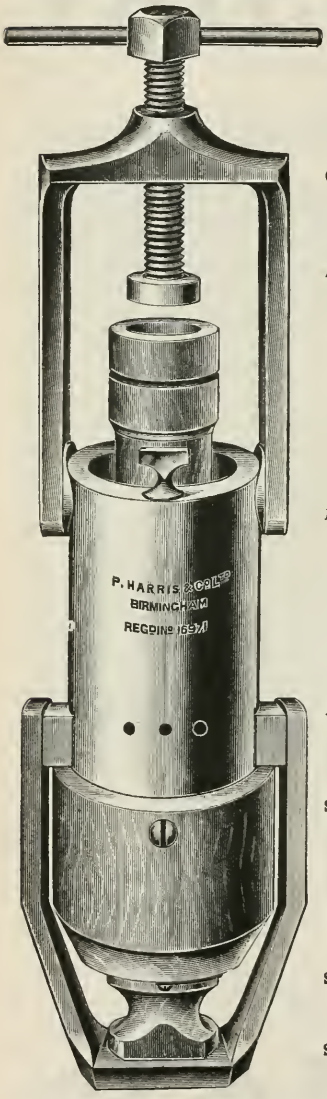

Fig. 7.

The "Hall-Edwards" Carbon Dioxide Snow Collector and Compressor.

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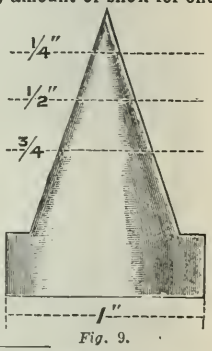

Fig. 9.

Fig. 9.—**Diagram of Compressed Snow,** showing broad base and cone-shaped projection. The transverse lines indicate the positions for cutting off the cone so as to produce **a circle of any desired diameter.**

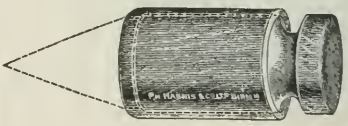

Fig. 10.

Fig. 10.—The applicator showing cone of compressed snow projecting from its lower end.

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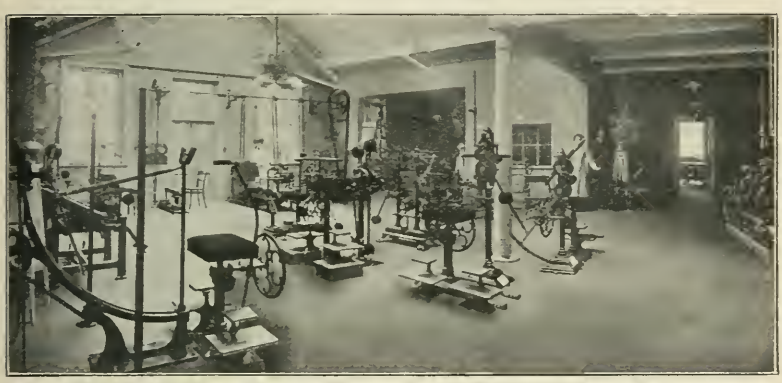

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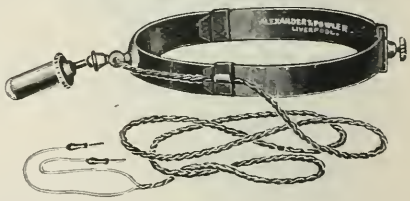

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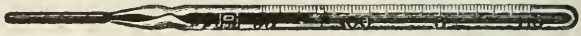

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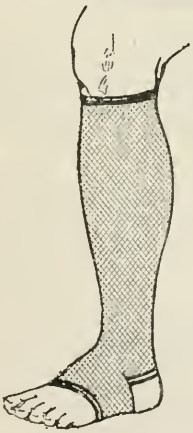

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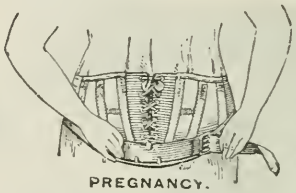

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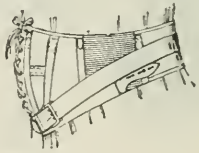

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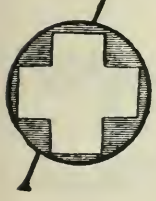

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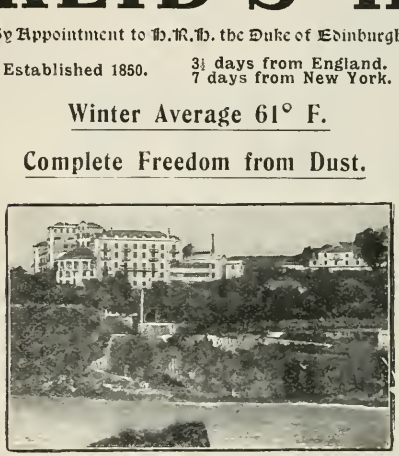

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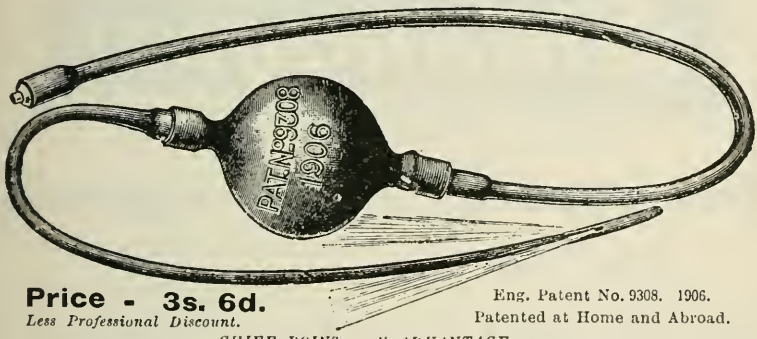

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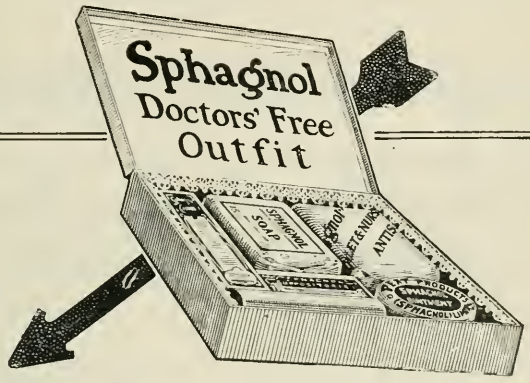

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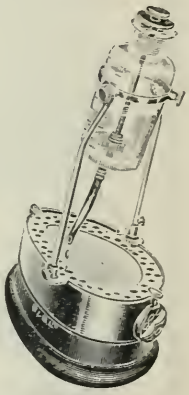

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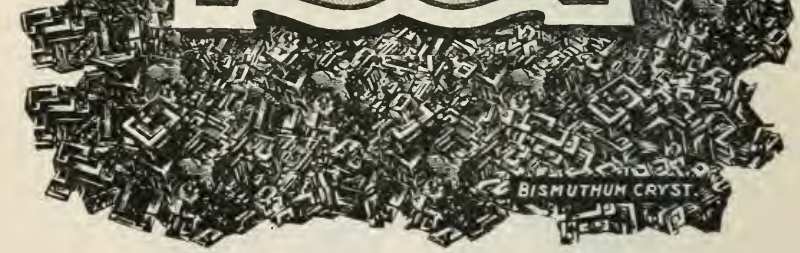

THE

MEDICAL ANNUAL:

A YEAR BOOK OF TREATMENT AND PRACTITIONER'S INDEX

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PREFACE

Our 35th Annual Volume has been produced under all the difficulties of the Great War, but our readers will find that not only is every section of the work complete, but that much original matter has been brought to our knowledge. It has been a year of over-strain, not only to members of the profession in the Field, but to those who have had to undertake extra duties at Home. The present volume will also show that it has been a year of stimulus. Every one has thought it necessary to do his best to elucidate the many new problems the War has caused us to encounter. The result has been a great output of literary material of a valuable character.

There is also evidence of this new stimulus in the work of our chemists, whom we have often reproached for allowing the manufacture of the new synthetic and other pharmaceutical products to remain in German hands. They have risen to the occasion, and this important part of medical service will never go back to former conditions.

It is interesting to observe that during a period of over-pressure, when every department of medicine is understaffed, we have indications of a general energy and ability which in former times was either lacking or sporadic.

Probably at no time during its existence has the Medical Annual served a more valuable purpose

than at the present moment, when so many changes of thought and practice have taken place, and our readers are distributed in distant parts of the world. To have all the best new work collated in a single volume is of absolute importance. It is for this reason that we have given full details of the newer operations, and also of chemical or bacteriological examinations, which the practitioner may have to conduct far from any other source of information.

To those who have assisted us in the production of this volume in spite of the great pressure on their time we are most grateful.

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The 'Medical Annual' Offices,
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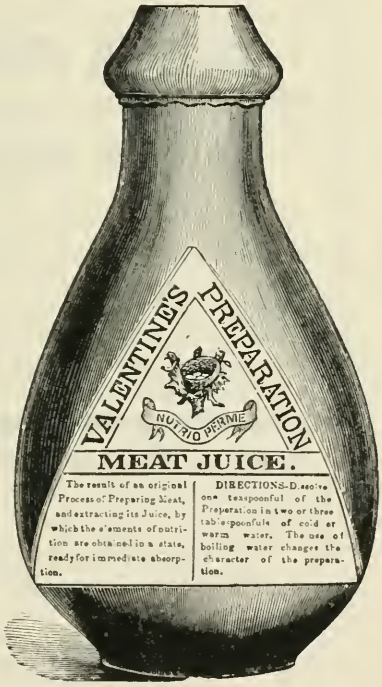
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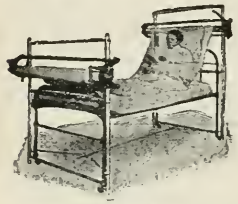
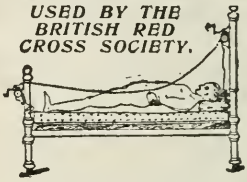


Sits patient up, changes its Sheet.



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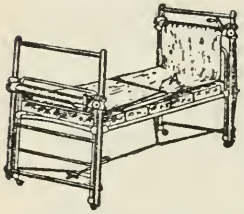

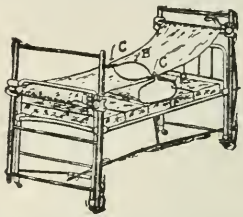

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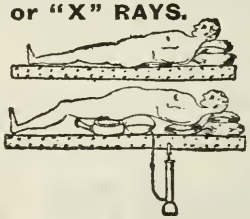

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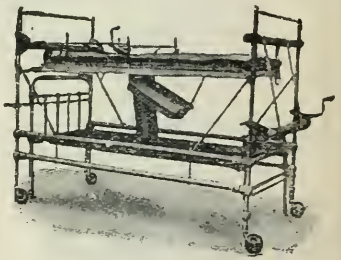

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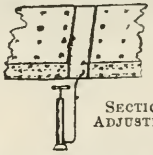

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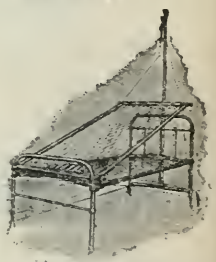

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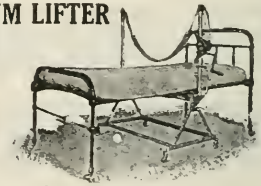

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THE MEDICAL ANNUAL

Part I.—The Dictionary of Materia Medica and Therapeutics.

REVIEW OF THERAPEUTIC PROGRESS, 1916.

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THE ADMINISTRATION OF DRUGS.

In order to produce an effect it is necessary that the drug be brought into intimate contact with the tissue-cells upon which it acts. This is accomplished by choosing a suitable form of administration. Speaking generally, a drug is used to act locally at the point of application or after absorption at some point remote from the site of administration. As examples of local action at the site of application we have the use of antiseptics in wounds, the actions of caustic, ointments, and paints in diseased conditions of the skin, and medicinal douches in the case of the accessible mucous membranes. In many instances some absorption takes place, and then we have an action somewhat more wide, but still localized chiefly to the immediate neighbourhood of the point where the drug is applied. This is well seen in the case of local applications to the conjunctiva of such drugs as cocaine, atropine, and physostigmine.

These local actions of drugs are, however, comparatively uncommon, and in the vast majority of instances the drug requires to be absorbed before it can exert the effect desired on some tissue remote from the site of application. In some instances the remote action is produced without actual absorption. Thus many volatile drugs may be inhaled, and produce an action on the lung tissue at some considerable distance before there is any absorption. Other familiar examples of the same remote local action are seen in the gastro-intestinal tract, where insoluble drugs—bismuth salts, zinc salts, liquid paraffin, etc.—are swept along unabsorbed.

When we desire the drug to be absorbed there are several methods which can be employed. The normal absorptive powers of the intestinal tract may be used and the drug be given by the mouth or

the rectum. Where the drug is soluble in the fats of the skin, it may be given by inunction; if volatile and non-irritating to the lung tissue, it may be given by inhalation. Where a more rapid or a more local action is desired, we can inject the remedy subcutaneously, or directly into a vein. In a limited number of instances the injection is made into special structures to procure a local limited action. Thus some drugs are injected into veins or round nerve-trunks, in other instances the injection is made into the cerebrospinal fluid, and in others the injection may be directly into the tissue of a gland or into a serous cavity. Where a drug is readily ionizable, it is possible to introduce small quantities by electrical methods directly through the skin. Each of these methods has its advantages and disadvantages.

Administration by the Gastro-intestinal Tract.

This is the commonest route for the administration of remedies in this country. It is the obvious method where it is desired to restrict the action as much as possible to the intestinal tract, e.g., stomachics, purgatives, anthelmintics, intestinal antiseptics. In many cases it is the route selected where the drug is intended to produce a comparatively slow action after absorption, as in the case of general tonics, diuretics, alteratives. When administered by the mouth, drugs are probably in many cases altered slightly by the acid gastric juice, and then by the alkaline intestinal juice, before being absorbed. After absorption the drug is carried to the liver, which has the power of retaining certain drugs.

The advantages of the oral administration are that it is easy, rapid, and can be carried out by the patient without much supervision. As the drug is usually fairly dilute, there is little risk of poisoning from carelessness in measuring the dose. The disadvantages of the oral administration are in the main the following :—

1. There is the risk of upsetting the digestion, due to too strong an action on the intestinal tract, or slow absorption from intestinal disease.

2. As the medicine is often made up in comparatively large quantities, there is the chance that changes may occur in it before it is all used.

3. It may be impossible to administer drugs by the mouth, as in the case of excessive irritability of the stomach, and in stricture of the œsophagus or pylorus.

4. Very little is known about the effect of diseased conditions of the gastro-intestinal tract upon the rate of absorption. Some drugs are not suited for administration by the mouth, as the digestive juices profoundly alter them, e.g., in the case of adrenalin, which is converted into an inert form.

The rectum has also the power of absorbing drugs, and a limited use is made of this.

Absorption from the Gastro-intestinal Tract.—There is not a great

deal of knowledge about the relative absorptive powers of the different portions of the gastro-intestinal tract. Absorption from the mouth is unimportant, as the drug rarely remains long enough for much absorption to take place. Cocaine and aconite produce their local actions when held in the mouth, and probably the effect of simple bitters is due to their action in the mouth. Recently morphine has been administered successfully by allowing soluble tabloids to dissolve under the tongue. Probably no absorption takes place from the œsophagus. It is usually held that comparatively little absorption takes place from the stomach, and that the main absorbing tract is the small intestine. Thus Dixon gives the relative absorptive powers of the gastro-intestinal tract as follows: Using a toxic dose of strychnine introduced into isolated portions of the tract, he found that to produce convulsions the drug required to remain fifty minutes in the œsophagus, thirty minutes in the stomach, ten minutes in the small intestine, fourteen minutes in the colon, seven minutes in the rectum.

Some recent work by Sollmann, Hanzlik, and Pilcher, Hanzlik, and Hanzlik and Collins, on gastro-intestinal absorption of drugs from isolated portions of the gastro-intestinal tract in dogs and cats, is interesting as showing that with different types of drugs different absorbing tracts come into prominence. The drugs tested were phenol, sodium iodide, and alcohol. All these drugs showed a very rapid initial absorption, followed by a curious inhibition, so that thereafter very little absorption took place. Thus, with phenol, it was practically completed within five minutes of introducing the drug into the isolated gut; with sodium iodide in ten minutes, and with alcohol in thirty minutes. For the next ninety minutes very little further absorption took place. The proportion absorbed varied: of phenol 25 per cent, sodium iodide 60 per cent, alcohol 80 per cent, was absorbed in the times mentioned. Further differences were shown in the absorbing powers of the different parts. For phenol the absorbing power of stomach and intestine was equal; for sodium iodide the small intestine throughout its length showed equal absorbing power; the stomach was one-third less efficient. With alcohol the stomach was slightly more efficient than the small intestine, but the colon showed the greatest power of absorption.

The mechanism of the inhibition of absorption after the initial rapid absorption also varied. Phenol inhibition is due to interference with circulation, and may be brought about either by local application to the intestine or by a systemic action when the phenol is injected into the blood-stream. The inhibition of sodium iodide and alcohol is a purely local phenomenon from direct contact with the absorbing epithelium. Previous intravenous injections of these drugs had no effect upon subsequent absorption, whereas phenol injections checked it. It is believed that the intestinal walls show a great avidity for alcohol and iodide, and that only the excess is allowed to pass into the circulation. It was observed that injury

to the mucosa, either mechanical or by caustic drugs, reduced absorption, while an induced hyperæmia, either mechanical by pinching the wall, or medicinal by irritant drugs—croton oil, spirit of mustard —increased it. Digitalis, strophanthus, and adrenalin increased absorption, whereas ice, sodium nitrite, calcium chloride, and chloral all reduced the absorbing power.

These last observations are interesting, as practically nothing is known about the effect of mixing drugs upon absorption. It appears from this work that the mucosa is the chief factor in absorption. The circulation is relatively unimportant. Absorption is independent of the blood-pressure within wide limits. A profound lowering of blood-pressure, comparable to a shock-pressure, reduces absorption.

Iron and heavy metals which are absorbed, are to some extent taken up by the leucocytes.

It is usually understood that drugs in solution are more rapidly absorbed than undissolved drugs. The presence of gums and colloid material delays absorption; hence purgatives which are intended mainly for their local action on the intestine are usually given in unpurified condition.

Among other factors which influence absorption from the intestinal tract is the presence of food, which protects the stomach wall from the irritant action of a drug, and also delays absorption. This is well known with regard to arsenic. A recent investigator found that he could take not more than $\frac{1}{15}$ gr. of arsenious oxide on an empty stomach without experiencing discomfort, whereas mixed with a dry diet he could take considerably larger quantities, up to $\frac{1}{2}$ to 1 gr.

The effect of drugs in producing gastric irritation is perhaps somewhat exaggerated. In recent years a large number of organic iodine, bromine, and salicyl compounds have been introduced to minimize any irritant action of the corresponding inorganic salts in common use. The organic compounds are usually insoluble in acid media, but break up in alkaline solutions. It is thus claimed that such drugs will pass through the stomach unchanged. The simplest method of preventing gastric discomfort of this nature is to add some free alkali to the mixture. The same effect is produced by administering the drug in capsules which resist gastric digestion. Thus, gelatin capsules are hardened by exposure to vapour of formaldehyde or formaldehyde in solution. As an extra precaution, the drug to be protected may be mixed with an inert fatty basis, which will not be split up by gastric digestion. Similarly, keratin-coated pills are sometimes used to avoid gastric irritation.

The possibility of the gastric juice affecting the potency of vegetable drugs containing glucosides should not be forgotten. Little is known about this. For tincture of digitalis we have some data available. It was found that artificial gastric digestion did not affect it, but prolonged pancreatic digestion in about half the tests distinctly reduced the potency.

Rectal Injections or Suppositories are sometimes employed, and are suitable means for introducing soluble drugs into the system. If bulky, a rectal injection readily passes into the colon, and, according to Drummond, reaches as high as the ileocæcal valve. Albuminous solutions are not absorbed when so given, but glucose, salts, alkaloids, and water are readily absorbed. It is said that sera are readily absorbed by the rectum. It is found that the rectal absorption of morphine is as rapid as the oral administration on an empty stomach. Occasionally volatile drugs have been administered in a gaseous form by the lower bowel. Thus oxygen is used in the treatment of mucous colitis. Sulphuretted hydrogen was at one time fairly extensively used in pulmonary phthisis. Ether anæsthesia can be obtained by pumping in ether vapour. This is occasionally used in cases where it is inexpedient to employ the ordinary inhalation method, as in operations on the throat or mouth. While quite feasible, the rectal application of ether vapour is sometimes rather troublesome, since gaseous distention of the intestine may prove unpleasant.

In hæmorrhage and slight shock, advantage is taken of the absorptive power of the lower bowel to introduce saline solution or glucose. The fluid at a temperature of 110° may be introduced slowly with a Higginson syringe or by gravity. Another method is continuous proctoclysis, wherein small quantities of hot saline solution pass into the rectum at the rate of about 700 c.c. in two hours (1 to 1¼ dr. per minute). The reservoir is only about six inches above the outlet of the rectal tube, so that the fluid escapes with very little pressure and the administration can be kept up for hours at a time.

Administration by the Skin.

The power of absorption by the normal skin is strictly limited. The stratum corneum and the fatty sebum prevent the passage of most substances through the skin. Absorption is by the glandular structures, which are full of fatty matter. As a rule, watery solutions of drugs are not absorbed. A notable exception is phenol.

Those drugs which are miscible or soluble in the fatty secretions of the skin are absorbed; thus most of the volatile oils are able to pass through the skin, and some—oil of copaiba, oil of gaultheria—are frequently applied in this way. If a drug is soluble in some medium which is miscible or soluble in the fats of the skin, it may also be absorbed, as is seen in the case of alcoholic solutions of iodine, chlorine, and perchloride of mercury, which penetrate deeply into the skin. Whether any further absorption takes place after such penetration depends upon the relative solubility of the drug in serum and the fatty material of the skin.

When the epithelial covering of the skin is removed, absorption is much more readily carried on. Before the introduction by Wood of the hypodermic method of injection it was a common practice to apply drugs to blistered surfaces, as it was found that from them

even insoluble drugs were freely absorbed. Apart from the occasional occurrence of arsenical absorption from the local use of arsenic in cancer, such absorption had almost been forgotten; but it was again noted when the use of bismuth paste in the treatment of sinuses became popular.

Subcutaneous Administration.

Injection of non-irritating solutions into the subcutaneous tissue is commonly employed when either a local action is required or a quick systemic effect is to be produced. Hypodermoclysis is used to introduce large quantities of fluid in hæmorrhage and toxæmia. By this route we avoid an action on the stomach, and are able to administer drugs when swallowing is impossible or when gastric action is undesirable. The method is in everyday use, and need not be further described. It is the usual method for administering sera, morphine, strychnine, etc. To be effectual it presupposes that there is absorption from the part injected; otherwise only a local action is obtained. When the circulation is very feeble, it is probable that absorption is slow. Injection into the subcutaneous tissue is also used as an infiltration means of producing local anæsthesia, weak cocaine or novocain solutions being employed. When a strictly localized action is desired, some adrenalin is added to produce ischæmia and delay absorption. The same effect of localizing action is obtained by using a constricting bandage and injecting peripherally to it.

Modifications of the subcutaneous administration are injections into nerves or into the vicinity of nerve-trunks, as in the treatment of sciatica and production of nerve anæsthesia by cocaine, alcohol, etc.

Intramuscular Injections.

Injections into the substance of muscles also lead to absorption and general systemic action. It is the site commonly selected for the injection of suspensions of insoluble drugs or those which are too irritating for subcutaneous injection. The muscular tissue is well supplied with lymph spaces, and the muscular contractions facilitate the distribution and absorption. These intramuscular injections are often much less painful than subcutaneous injection, as the muscle tissue is less efficiently supplied with sensory nerves than the subcutaneous tissue. Recent work on mercury and salvarsan indicates that in many cases, even though relatively painless, intramuscular injections are productive of much local disturbance, with necrosis, hæmorrhage, and formation of an insoluble depôt of the drug. The absorption is irregular in the case of drugs producing such local reactions.

The general rule in administering a drug intramuscularly is to inject it deeply into the muscle tissue, selecting a muscle which is not compressed when the patient rests in bed. As a rule the upper

portion of the gluteal mass is selected. The neighbourhood of important nerves should be avoided. With insoluble drugs the idea underlying this form of administration is that a local depôt of the drug is formed from which gradual absorption takes place, so that the tissues are kept under the action of the drug for a prolonged period.

Many unpleasant results may follow intramuscular injection. The least important is the formation of a tender infiltrated mass, which is gradually removed. In more troublesome cases the injection results in the breaking down of muscle tissue, with formation of a sterile abscess in which the injected material remains partially unabsorbed. When the injection produces this local disturbance in the neighbourhood of a nerve, serious permanent discomfort may result.

The use of an oily medium for suspending or dissolving the drug seems to delay the absorption, and is sometimes taken advantage of in producing a local depôt of a drug, which is then slowly absorbed, as in the case of iodipin and other organic halogen combinations.

Lewin found that with the intramuscular injection of a soluble drug, sodium salicylate, the concentration of the drug in the blood-stream was greater than with subcutaneous or oral administration: but it disappeared in ten hours from the blood-stream, whereas with subcutaneous administration it remained in the blood for twenty-two hours. Oral administration gave the lowest concentration but the longest stay (thirty-two hours) in the blood. Obviously the determining factor is the rapidity with which the drug reaches the blood-stream, as the excretory organs should remain fairly constant in activity. Directly introduced into the blood-stream, many drugs are very rapidly removed, as has been shown for digitalis, strophanthus and strychnine.

Epidural, Caudal, or Sacral Anæsthesia.

This is a special form of local infiltration anæsthesia of nerves. The pelvic nerves in the sacral canal are thus treated for various pelvic neuroses, incontinence of urine, and sexual neurosis. Recently the method has also been used successfully to produce surgical anæsthesia in the regions supplied by the nerves.

Whereas in spinal anæsthesia the injection is made directly into the dural sac, in the epidural method the fluid does not reach the dural sac, but comes into contact with nerves after leaving the sac, while traversing the sacral canal. It is a special application of perineural injection. Thus much larger quantities of fluid are required, and larger amounts of the anæsthetizing drug.

Technique.—The patient lies on either side, with knees drawn up. The last sacral spine is palpated; below is the sacral triangle, with the hiatus at the upper apex. The skin and subcutaneous tissue are anæsthetized, and then, with a long needle introduced about one inch below the last sacral spine, the deeper parts are anæsthetized and the opening in the sacral hiatus is reached. Still injecting, the needle is

now pushed for about 2·3 inches through the opening, keeping the point of the needle towards the back of the sacral canal. After aspirating to make sure that no vein is punctured and that the dural sac has not been entered, the remainder of the solution is now injected. For neuroses, etc., saline solution is used, but for anæsthesia a novocain solution is required. According to its strength the quantity varies: thus 20 to 30 c.c. of a 2 per cent solution, 40 c.c. of a 1·5 per cent, 80 to 90 c.c. of a 0·5 per cent.

After the injection is completed, the patient turns on his back to avoid one-sided anæsthesia. The anæsthesia affects mainly the smaller nerves of the sacral plexus and a few terminal filaments of the coccygeal plexus. The great sciatic usually escapes, but the pudic, and the small sciatic, with the inferior pudendal branch of the vesical nerve, are anæsthetized, involving the lower part of the rectum, the perineum, vaginal floor, posterior half of external genitals, bladder, prostate, penis, and clitoris. The anterior skin and scrotal contents, anterior portion of the vulva, the upper part of vagina, and uterus escape. Anæsthesia lasts from forty-five to a hundred and twenty minutes. The method is somewhat uncertain, as 10 per cent of failures occur.

Two recent developments of administration are those of injecting drugs directly into the venous blood and directly into the cerebro-spinal fluid.

Intravenous Injection.

Intravenous injection has for long been one of the favourite methods of administering drugs in pharmacological experiments, but it was not employed therapeutically in man till recently. It was supposed to be a risky proceeding, as undue weight was laid upon the deleterious effect of introducing air into the vein and the risk of sepsis. Sporadic use of intravenous medication in transfusion of blood had been occasionally employed, and the possibilities of the method indicated, but the general introduction is undoubtedly due to the selection of this route for the administration of salvarsan. Mendel had previously advocated the intravenous injection of such drugs as iodides, salicylates, and cardiac tonics such as digitalis, but seems to have had few imitators.

There is no great difficulty in injecting a drug into a vein. It is necessary to employ a solution which does not either clot the blood, injure the vein, or lake the blood.

Technique.—Any vein may be selected, but as a rule the large veins at the bend of the elbow are chosen, as the veins here are of large calibre and fairly fixed. The vein is distended by compressing the arm above the vein to be injected, either with the fingers or with an elastic bandage or air-pressure with the manchette of a sphygmomanometer. The site of the injection is then sterilized by painting with tincture of iodine. The needle used should be very sharp, and

if a syringe is used, it must be sterile and in good working order. In introdueing the needle, it should be steadily pushed nearly parallel with the vein. The slight obstruetion offered by the wall of the distended vein is soon recognized after a little experienee. To insure that the needle is really inside the vein, the piston of the syringe should be slightly withdrawn, when blood will be drawn in if the needle is properly introdueed.

For injecting small quantities of fluid an ordinary 'Record' syringe is employed. When the quantity of fluid is larger than an ordinary syringe will contain, some simple form of infusion apparatus is required. Any sterile glass vessel whieh ean be fixed on to rubber tubing ean be used. In an emergency a filter-funnel ean be employed, but a separating funnel furnished with a stopcock is more satisfaetory. The reservoir is eonnected to the needle by sterile rubber tubing, a small length of glass tubing being inserted near the needle to allow of the detection of air, blood, or foreign material. Before inserting the needle, the whole apparatus is flushed out with sterile saline solution, which is allowed to escape through the needle till only a trace remains in the reservoir, when further escape is checked by the stopcock or other clamping arrangement, so that the rubber tubing and needle remain full of non-irritating saline solution. The needle is then introdueed with the tube clamped. The reservoir is then brought below the level of the vein, and the elamp or stopcock opened, when blood will soon appear at the glass window if the needle is properly introduced. As soon as it appears, the reservoir is filled with the injection fluid, and the constrieting bandage to the arm removed, and then, raising the reservoir, the fluid flows in by gravity. When the infusion is eompleted, the rubber tubing is clamped, the needle is withdrawn, and the puncture is sealed with collodion.

Certain diffieulties are often met wit). The most common trouble arises from the needle being insufficiently introduced. It must be remembered that the opening in the sharp edge of the needle is fairly long ; therefore the needle must be pushed in about a quarter of an inch after the vein is punctured ; otherwise there is the risk that not all the opening is inside the vein. In such eases, while blood escapes on aspiration, on injection some of the fluid escapes from the part of the opening outside the vein and eauses an infiltration to occur. Another trouble arises when the needle is introdueed at too great an angle with the vessel wall. In this ease the opposite wall may be punctured. Henee the advice to introduce the needle nearly parallel to the vein. It is a sound plan to use a fairly long needle, especially if the syringe attached is wide, as otherwise it will sometimes be found impossible to avoid puncturing the vein at too great an angle.

While intravenous injeetions are, as a rule, easily made in adults who are not too obese and whose blood is fairly normal, considerable difficulty is found with fat patients whose veins are deeply buried. Anæmic states also cause trouble. Thus, in pernicious anæmia the

blood is poor in colour, and it is often difficult to distend the vein properly. Stiffness of the elbow may also cause trouble if the needle cannot be got to lie at the right angle.

The most frequent result of such difficulties is that some of the fluid to be injected escapes into the connective tissue. As a rule this is readily detected by the swelling and the obstruction to the flow, while the patient may complain of pain. In such cases the injection should be stopped, the needle withdrawn, and pressure used to express the escaped fluid if it is irritating and likely to cause trouble. In most cases little discomfort occurs, as the fluid is absorbed. When an infiltration occurs, warm compresses should be applied.

A hæmatoma is often produced if the needle is not quickly introduced. In a few cases a local thrombosis develops at the site of injection, and in exceptional cases at a point remote from that site. The introduction of air is rarely of any moment, as the small quantities in question are soon disposed of.

In most cases the best vein to use is one of the large ones at the bend of the elbow, as previously stated, but others are occasionally selected in the forearm or leg. The introduction of the needle is then rather more difficult, as the veins are apt to roll about and are not so easy to puncture at the correct angle.

When the needle requires to be kept in the vein for some time, as with prolonged saline infusion, administration of anæsthetics, etc., it is often advisable to expose a suitable vein, ligature it, open it above the ligature below a clamp, and tie in a blunted cannula. The same course is also indicated when the patients are abnormally fat, or when the vein does not distend.

In infants the superior longitudinal sinus may be selected and the injection made through the anterior fontanelle. In one method of local anæsthesia the drug is injected into a vein distended between two bandages, so that a local—not general—action is produced.

Intravenous injections are used for the rapid introduction of drugs —salvarsan, neosalvarsan, strophanthin, gynocardiates, colloidal solutions, quinine—for serum therapy, and for introducing fluid rapidly, as in acute hæmorrhage, diabetic coma, collapse in cholera, and in producing anæsthesia.

The advantages of the intravenous route are the certainty that the drug reaches the circulation, the rapidity with which the action is produced, the accurate dosage, and the avoidance of gastric or local irritation. The disadvantages are the following: (1) Some experience is required, and the presence of the doctor is essential. (2) The drug produces its maximum action at once, and the heart receives the whole force of the drug almost immediately. Thus strophanthin injected intravenously produces its full action within half an hour, whereas with oral administration a couple of days or so are required to produce a similar effect. On the other hand, the action rapidly passes off, as a drug injected into the blood-stream is rapidly removed.

either becoming fixed in the tissues or removed by excretion. With oral, subcutaneous, or intramuscular administration, the drug does not immediately reach the blood-stream. It is absorbed and reaches the blood more gradually. Once it reaches the blood-stream it is, of course, as rapidly removed as a drug directly injected into the blood-stream; but as more of the drug is absorbed, a fresh supply is for a time constantly being given to the blood, and thus, though excretion is continually going on, a more prolonged blood action is obtained.

Intravenous anæsthesia was recently advocated, but soon passed out of use. The anæsthetic drugs are dissolved in normal saline, and at first are fairly rapidly introduced into the blood-stream; when anæsthesia is established, smaller quantities are required to maintain it. Chloroform tends to lake blood and produce hæmoglobinuria. Ether 5 to 7 per cent in normal saline is better borne. As a rule about 500 c.c. are required to produce anæsthesia, but thereafter about one pint an hour is sufficient. To avoid the use of such large quantities of fluid, hedonal has been recommended, a 1 per cent solution being employed.

Intraspinal Injections.

Intraspinal injections are used to wash out the dural sac, to produce anæsthesia, and to introduce curative drugs and sera, as drugs are not excreted into the cerebrospinal fluid. The introduction of the solutions into the cerebrospinal fluid is usually easy. The injection is made at the lower end of the cerebrospinal space, so as to avoid injuring the cord or cauda equina. The landmark is a line joining the highest point of the crests of the ilia which passes over the space between the fourth and fifth lumbar vertebræ. This line is marked on the patient's skin with iodine or a skin pencil. The injection in children is made in the centre between the spinous processes. In adults it is customary to introduce the needle about half an inch to the side of the middle line and push it upwards and inwards. Entrance into the canal is shown by the escape of cerebrospinal fluid. Some cerebrospinal fluid is allowed to escape, and the drug to be injected is usually dissolved in some of the fluid and re-injected.

The best position is with the patient sitting up, with the knees drawn up and the back bent forward to widen the space between the vertebral spines. Beware of the misleading curvature which develops when lying on the side on a soft mattress. Thus, if the patient cannot sit up, it is best to let him lie on a rigid surface such as a table.

For sensitive patients a preliminary injection of novocain may be used to anæsthetize the skin. When the patient is struggling, or where there is hypersensitiveness, a general anæsthetic may be required.

DICTIONARY OF REMEDIES.

ADRENALIN.

Boogher[1] states that adrenalin solution 1–1000, given by the mouth in 15-min. doses in a tablespoonful of water is of value in relieving **Abdominal Pain.** He has used it in abscess of the transverse colon, in gall-stone and renal colic, and considers it a panacea in all forms of abdominal pain. Richter[2] believes that adrenalin thus given acts locally without producing a systemic action. The local action is partly a relaxation of the intestinal muscles, and this relaxation seems to include the gall-bladder musculature, as the pain of gall-stone colic is relieved if not due to ulceration or inflammation. The analgesic action lasts about an hour, but the dose can be repeated as often as required.

S. J. Meltzer[3] advises the intraspinal injection of 2 c.c. of 1–1000 solution of adrenalin every four to six hours in **Acute Anterior Poliomyelitis.** It is well to withdraw a large quantity of cerebrospinal fluid before the first injection, but subsequentl it is not advisable to remove much of the fluid, as thereby useful antibodies may be removed. Meltzer bases his advice on the results of certain animal experiments in which he found adrenalin thus used a powerful stimulator to the respiratory centres. Further, the vasoconstriction induced by the drug diminishes the risk of the congestive areas surrounding the small foci of infection involving vital structures such as the respiratory centre. This tides over the dangerous period till the tissues elaborate antibodies and thus diminish the congestion round the tissue destroyed.

The treatment should be kept up for four or five days after all paralysis disappears, or at least until no further reduction in the extent of paralysis is obtained.

References.—[1]*N.Y. Med. Jour.* 1916, ii, 94; [2]*Ibid.* 286; [3]*Ibid.* 337.

ALCOHOL.

Some new and exhaustive investigations carried out by Dodge and Benedict[1] on college graduates who were very moderate users of alcohol, and on patients who had been under treatment for alcoholism, agree in showing that alcohol in small doses (30 to 45 c.c. of absolute alcohol) exerts a general depression on the neuromuscular processes at all levels of the cerebrospinal system. There was no true stimulation, and impairment seems to be the keynote expressed by this depression. The processes tested included patellar reflex, protective eyelid reflex, certain eye reactions to peripheral stimuli, speech reaction to visual word stimuli, partial memorization of series of words, motor co-ordination and reciprocal innervation of muscles, while sensory changes were studied by faradic threshold measurements. All were depressed after alcohol. The latent period of the patellar reflex increased 10 per cent, the protective eyelid reflex 7 per cent, eye reactions 5 per cent, speech reactions 3 per cent. Memory

was only slightly affected, but sensitiveness to faradic current increased 14 per cent, while muscular movement of the finger and eye decreased 9 and 11 per cent respectively.

REFERENCE.—[1]*Jour. Amer. Med. Assoc.* 1916, i, 742.

ANTIMONY. (*See also* LEISHMANIASIS.)

Brahmachari[1] has tested various antimony preparations in **Kala-azar.** Colloidal antimony gave encouraging results when used in doses of 0·002 grm. intravenously. The treatment was kept up daily for about three weeks. The blood showed rapid improvement, and the spleen diminished notably in size. More rapid results were obtained with metallic mercury in a very fine state of subdivision as an impalpable powder. The drug was given intravenously in doses ranging from $\frac{1}{2}$ to $1\frac{1}{2}$ gr. As a rule improvement was very rapid, only three or four injections being required. The blood became normal, the spleen diminished in size, fever subsided, and Leishman-Donovan bodies disappeared from the spleen. The soluble salts of antimony, viz., tartar emetic and antimony sodium tartrate, are also efficient, but are slower in action than metallic antimony, and are more apt to produce unpleasant side-action. The results are also less permanent.

REFERENCE.—[1]*Ind. Med. Gaz.* 1916, 173.

ARTIFICIAL RESPIRATION.

Yandell Henderson[1] states that universal training in the **Prone Pressure Manual Method** of resuscitation will accomplish more for resuscitation from drowning, electric shock, and asphyxia than is possible by providing any amount of apparatus. Artificial respiration with apparatus can give a normal volume of pulmonary ventilation which the manual method cannot achieve : but the delay in obtaining the apparatus outweighs this advantage, and the immediate application of the poorer manual method gives better results. Apparatus should only be provided in places when it is immediately available. All apparatus should be of a simple type. In gas and smoke cases, oxygen inhalation should be employed immediately, and the apparatus should be such as will allow the oxygen to reach the lungs in efficient concentration.

REFERENCE.—[1]*Jour. Amer. Med. Assoc.* 1916, ii, 1.

CALENDULA.

Gregory[1] states that an extract of calendula (the common or garden marigold) is a trustworthy, non-poisonous **Antiseptic.** He uses a non-alcoholic fluid extract, and finds it useful in burns and dirty wounds, in preventing formation of pus. Externally applied with lead acetate it is of use, he says, in acute **Synovitis** and **Sprained Joints.**

REFERENCE.—[1]*N.Y. Med. Jour.* 1916, ii, 67.

[For many centuries calendula enjoyed a reputation as a 'vulnerary.' It was usually directed to be employed in the form of the juice

of the leaves, mixed with vinegar. This was applied to sprains, bruises, or any 'hot swelling.'

During the American Civil War, a tincture of calendula, diluted with water, was largely employed for the treatment of wounds, and was reported to give excellent results. One surgeon declared that "no suppuration could live under it." The use of calendula and similar vegetable extracts was given up on the supposition that they were not 'antiseptic.' Whether calendula owes its virtues to the fact that it is antiseptic is a doubtful point, but we know that carbolic acid and other phenols delay the healing process in spite of their antiseptic properties. The time has come when various vegetable extracts which long enjoyed a reputation for the rapid healing of wounds should be considered, not in the light of some particular theory, but in that of clinical experience. The therapeutic action of hamamelis has never yet been explained by pharmacological experiment, but no one doubts its value.

Calendula ointment may be made as follows: The freshly picked leaves and the flowers of the marigold are washed and bruised, placed in a receptacle, and covered with melted benzoated lard. After being exposed to gentle heat for, say, ten hours, the ointment is filtered through a muslin bag.—Ed. MED. ANN.]

CHAULMOOGRA OIL. (*See also* LEPROSY.)

This old-established remedy in **Leprosy** is attracting attention, since various attempts are being made to overcome the unpleasant side-actions produced by oral administration. Mercado suggested the hypodermic use of a mixture of chaulmoogra oil, camphorated oil, and resorcin, which seems to be therapeutically active. Hopkins tried a weak alkaline emulsion, but found it too irritating to be used hypodermically. Vahram has devised a weak emulsion of sufficient fineness to be used intravenously, the globules in this pseudo-solution being as fine as colloid grains and appearing like cocci under the microscope. It is a suspension of the oil in gum arabic. It contains very little oil (0·0144 grm. of the gum to 0·00072 grm. of the oil), but in the fine state the drug seems more active. It is also possible to use the emulsion hypodermically, as it is non-irritating. Recently Rogers[1] has used gynocardate of soda intravenously with satisfactory results.

REFERENCE.—[1]*Brit. Med. Jour.* 1916, 550.

COAGULEN.

Kaempfer[1] reports very favourably of the hæmostatic action of 10 per cent freshly prepared coagulen in **Nasopharyngeal Operations.** He has employed it to control bleeding after tonsillectomy, using gentle pressure with a sponge soaked in 20 per cent solution in normal saline for about a minute. It controls the bleeding so rapidly that it is quite possible to perform double tonsillotomy at one sitting. It is also very successful after curetting for adenoids. Intra-

nasal submucous resections do not develop hæmatomata if the nose is packed for twelve hours with gauze soaked in the same solution. Coagulen is an extract of blood-platelets.

REFERENCE.—[1]*Amer. Jour. Surg.* 1915, ii, 401.

COPPER.

De Witt and Sherman[1] have shown that in low concentrations inorganic copper salts kill or inhibit the activity of many pathogenic organisms. The individual organisms vary in their susceptibility to the toxic action of copper. Thus the tubercle bacillus is more resistant than the colon and typhoid groups. Recently Shaw-Mackenzie has investigated the action of organic copper salts on protozoa. He tested a copper ammonium sulphate obtained by adding excess of ammonia to copper sulphate and then evaporating to form crystals. This furnishes dark-blue rhombic prisms, readily soluble in water, but the solutions are unstable and precipitate. The addition of a small quantity of glycerin or other amino-acid prevents this. He was then led to investigate the action of copper compounds of the amino-acids. Copper-alanine forms deep-blue needles and prisms, soluble in water and in serum but insoluble in alcohol. The solubility in blood-serum is of importance, and the copper-alanine does not precipitate albumin on adding to egg-white, milk, or solution of caseinogen. Thus the preparation can be used for either intramuscular, subcutaneous, or intravenous injection. Copper-alanine is relatively non-toxic for mice and rabbits. The bactericidal action on *Bacillus typhosus* and *B. pyocyaneus* in defibrinated blood is negligible, but in weak solutions it has a very marked lethal action on protozoa. Shaw-Mackenzie suggests that copper-alanine should be tested therapeutically in diseases due to protozoa and to intermediate forms of animal and vegetable cell life.

REFERENCE.—[1]*Med. Press and Circ.* 1916, ii, 50.

DIARSENOL. (*See also* GALYL, INTRAMINE, NEOSALVARSAN, SALVARSAN.)

In view of the failure of the supply of German salvarsan and neosalvarsan, substitutes prepared in this country and Canada have come into use. The Canadian product is called diarsenol. Its therapeutic properties seem quite equal to those of salvarsan, but according to some observers the product is not so uniform in appearance. It forms darker solutions and appears to oxidize more rapidly. Syncope immediately after intravenous administration has been recorded by Likes and Schoenrich[1] in three cases, all of which recovered, while Gardner also reports three instances in which considerable reaction and shock were experienced.

REFERENCES.—[1]*Jour. Amer. Med. Assoc.* 1916, ii, 64; [2]*Ibid.* i, 1303.

DIGITALIS.

From a clinical and electrocardiographic study on patients with nodal rhythm, no œdema, and low or moderate pressure, Cohn[1] finds that slowing the heart-beat is not the primary action of the drug.

There is a definite slight reduction in conductivity, so that the ventricular beat is delayed, and in cases where digitalis is pushed this may develop into complete heart-block, but the auricular rate is not slowed. A new evidence of digitalis action is described as a reduction in the extent of the T wave in the electrocardiogram, which under continued use of the drug becomes more reduced, then isoelectric, and eventually may become inverted. This change lasts for some days after stopping the drug. Similar changes occur in febrile patients receiving digitalis. In non-œdematous patients with nodal rhythm and without high blood-pressure, no diuresis is produced, and the blood-pressure is not raised. He believes that the drug acts both on the nervous and muscular elements of the heart. He is led to this conclusion from observing that an injection of atropine can restore the normal rhythm when this has been affected by digitalis, while it does not alter the inversion of the T wave.

Hatcher and Eggleston[2] state that the infusion of digitalis keeps fairly well: with ordinary care no change occurs in a week. The addition of alcohol is unnecessary. The infusion represents the whole leaf in activity, but, owing to variability in the activity of the infusion as it is commonly obtained, the tincture should be preferred for therapeutic purposes.

REFERENCES.—[1]*Jour. Amer. Med. Assoc.* 1915. ii, 1527; [2]*Ibid.* 1902.

ELDERBERRY.

Vetlesen[1] confirms former observations of Epstein and Jokl that the juice of elderberry (*Sambucus niger*) acts favourably in primary **Neuralgia.** It is useless in neuritis and in traumatic or inflammatory forms. Vetlesen gives 30 grms. twice daily, with 10 grms. of port wine added to each dose. Pain is promptly relieved, and in about half his cases the treatment could be stopped within eight days.

REFERENCE.—[1]*Norsk Magazin for Laergevidenskaben*, 1916, 193 (*Med. Rev.* 1916, 176).

EMETINE. (*See also* AMŒBIASIS.)

Pellini and Wallace[1] have investigated the pharmacological action of emetine. They find that it depresses the heart, which may be paralyzed. Both auricle and ventricle are affected, and a general weakening of the heart action results. The peripheral vessels are not dilated, and the fall in blood-pressure is entirely due to the heart weakness. Given intravenously, the heart may fail before the respiration, but after subcutaneous administration the respiration may fail first. Emetine given by the mouth or subcutaneously is excreted into the gastro-intestinal tract, causing congestion and inflammation. This excretion into the intestine perhaps enables sufficient of the drug to be present to act as an amœbicide, as the doses generally employed would not give sufficient concentration to be effective when diluted with the whole volume of the blood. The general metabolism is upset, with increase in the nitrogen loss and acidosis.

The question of permanency of cure in **Dysentery** after emetine injections is brought prominently to the front in view of two recent papers by Dobell[2] and Jepps.[3] Both writers used emetine thoroughly, and then examined the fæces repeatedly for some weeks. In neither series were the ultimate results very satisfactory. In Dobell's series two-thirds of the cases relapsed after a temporary stage wherein the stools were free from amœbæ. In Jepps's cases the after-examination was not kept up for so long a period, and this perhaps explains why only 57 per cent of the cases showed the reappearance of the amœba in the stools after the treatment was completed. The date of the relapse varied from the fourth to the twentieth day.

According to Dobell, the double salt, *emetine bismuth iodide*, given by the mouth in cachets containing 1 gr., thrice daily, is superior in therapeutic efficacy to emetine hydrochloride hypodermically in the case of amœbic dysentery. It appears to be a true specific for *Entamœba histolytica* in both the amœbic and cystic stages. Within four days of initiating the treatment the amœbæ completely disappear from the fæces and do not return. The treatment advised consists of giving a total of 36 grains. The drug is apt to produce nausea and vomiting, but, if persisted in, tolerance is rapidly established.

Chalmers and Papatheodoru,[4] discussing the use of emetine in pregnancy and menstruation, state that the maximum dose which can safely be employed in pregnancy is ½ gr. (0·03 grm.) daily. In menstruating women, one of the author's experiences seems to indicate that emetine may arrest menstruation. W. Beresford Robinson[5] advises the use of emetine in **Dysmenorrhœa** in doses of ⅔ gr. daily for the day preceding the period and the first two or three days of the period. The drug is said to alleviate the condition without being in any way depressant. The same author warmly recommends emetine injections in ½- to ⅔-gr. doses daily for arresting **Hæmoptysis.** This is kept up for four or five days after the cessation of the bleeding. In mild cases the bleeding is checked within three days. He also found emetine useful in a case of **Mucous Colitis** with hæmorrhage.

References.—[1]*Amer. Jour. Med. Sci.* 1916, ii, 325; [2]*Brit. Med. Jour.* 1916, ii, 612; [3]*Ibid.* 616; [4]*Jour. Trop. Med.* (& *New York Med. Jour.* 1916, Dec. 4); [5]*Pract.* 1915, 514.

ETHYLHYDROCUPREIN.

Comparing the actions of ethylhydrocuprein (optochin) and quinine, Smith and Fantus[1] state that the former is more toxic, and in view of this they advise caution in its clinical use, especially as regards intravenous administration. Given intravenously, optochin depresses the heart more than quinine, but owing to peripheral vasoconstriction the blood-pressure is less lowered than after quinine. In experimental fever in rabbits, optochin is less efficient as an antipyretic. As regards the local use in eye infections, a 2 per cent solution is irritating to the conjunctiva.

Reference.—[1]*Jour. Pharmacol. and Exper. Therap.* 1916, Jan.

FORMALDEHYDE.

Earp[1] has seen three cases where large quantities of formalin were swallowed. Thus in one case 4 oz., in another 1½ oz., and in the third ½ oz. of formalin were taken. The symptoms were rapidly produced, and in the main consist of collapse, subnormal temperature, and marked cyanosis, so that one case resembled argyria. The blue colour may persist for four days. In all the cases recovery occurred under lavage with weak ammonia or sal volatile.

Reference.—[1]*N.Y. Med. Jour.* 1916, ii, 391.

GALYL. (*See also* Syphilis.)

Contrasting the action of galyl and neosalvarsan in the treatment of **Syphilis,** Dudley[1] states that less reaction is to be expected after the former. The majority of reactions after intravenous injections of either drug are due to the liberation of endotoxins. The treponemacidal action of galyl is a little slower than that of neosalvarsan, and it has slightly less effect on the Wassermann reaction. A dose of 0·4 grm. of galyl is not quite equal to a dose of 0·9 grm. of neosalvarsan in the cure of syphilis. He thinks that it is advisable to use galyl more frequently than neosalvarsan, and that three doses at intervals of ten days would give good results. His general conclusion is that galyl is a safe, useful substitute for neosalvarsan and salvarsan, but requires to be used more frequently to get full curative results.

Spence[2] has used one thousand intravenous injections of galyl, and finds that it clears up symptoms just like salvarsan and neosalvarsan. It seems at times to be more efficacious on the large papular syphilide. Galyl produces the same toxic action as salvarsan. It does not seem to be highly toxic. In a few of Spence's cases mild reactions occurred after the injections, but there was no fatal case. If the patient has partaken of a hearty meal shortly before intravenous injection of any drug, vomiting is not uncommon, with chilliness, rigor, pyrexia, or even purging or enuresis. If the patient has been properly prepared, has rested well, and has the alimentary tract cleared out, such symptoms are unusual.

Foerster[3] records a few cases of early syphilitic infection in which he has used galyl intravenously. He agrees with other observers in noting that it is as efficient as salvarsan and neosalvarsan. Primary lesions heal rapidly, and all secondary rashes respond well and quickly. The drug produces a general tonic action, and ill-effects were trifling.

References.—[1]*Jour. R.N. Med. Serv.* 1916, July, 289; [2]*Lancet*, 1915, Dec. 7; [3]*Ibid.* 645.

GARLIC.

Recently the claim has been made that garlic is possessed of valuable curative properties in **Whooping-cough.** Hovell[1] advises the following method. The cloves of garlic are peeled, cut into fine slices, and worn under the soles of the feet between two pairs of socks, to avoid pressure irritation while walking. Within half an hour the

odour of garlic usually appears in the breath, and the whoop and spasm usually disappear within forty-eight hours. The garlic should be worn for a week or ten days, according to the severity of the case. Garlic may also be administered orally as a bread-sauce made by chopping up the peeled cloves, boiling them in milk, and mixing with bread-crumbs. Latimer[2] mentions that in whooping-cough he has used garlic stewed down in olive oil and rubbed into the back and chest. Bain[3] emplo ed a fluid extract of garlic as an inhalation in **Pulmonary Tuberculosis**, and finds it beneficial. **Tuberculosis of Joints** can be treated successfully by garlic-juice applied on white lint, covered with gutta-percha tissue. Thus applied it frequently produces profuse vesication, which may sometimes necessitate temporary cessation of the treatment.

References.—[1]*Brit. Med. Jour.* 1916, ii, 15 ; [2]*Ibid.* 93 ; [3]*Ibid.*

[Garlic (*Allium sativum*) is one of the many time-honoured remedies which have disappeared from modern practice. It had great reputation as a stimulating expectorant, and was found valuable in **Chronic Bronchitis.**

Bruised garlic cloves were frequently used as a poultice in cases of **Catarrhal Pneumonia,** and such a poultice was often applied to the feet to soothe the **Nervous Restlessness of Children,** and as a remedy for **Convulsions.**

Syr. alii aceticus, U.S.P. 1890, is a convenient preparation ; the dose is 1 to 4 dr. This has been used with considerable success in **Phthisis.** It diminishes the cough, soothes restlessness, and aids sleep. It is also said to relieve the night sweats. The expectoration is also reduced.

Small doses of the syrup have been used with success in **Acute Coryza.** When given at an early stage, rapid results are sometimes attained.—Ed. Med. Ann.]

INTRAMINE. (*See also* Syphilis.)

This substance, di-ortho-amino-thio-benzene, which was suggested by McDonagh for the treatment of **Syphilis,** has been tested by Spence,[1] who uses intramuscular injection of 1 to 2 grms. suspended in oil. The local reaction is comparatively slight. Twenty-four to forty-eight hours after the injection a rise of temperature (rarely over 103°) and some malaise may be looked for. It is not of much use in early cases, but is an efficient remedy in later secondary syphilis and in recurrent and tertiary lesions. It appears also of value in cerebro-spinal syphilis. It was useful in some chronic non-syphilitic processes, e.g., **Lupus Vulgaris** and **Chronic Leg Ulcers.**

Reference.—[1]*Lancet,* 1916, ii, 861.

IODOFORM.

In all forms of **Bloody Diarrhœa,** whether due to dysentery, typhoid fever, or other cause, Moszkowski[1] recommends the injection daily of an emulsion of iodoform. He emulsifies 80 grms. with 100 grms. gum

acacia in 180 c.c. distilled water, and injects 45 to 55 c.c. of this into the bowel daily, using a soft tube introduced into the rectum for 50 cm. The patients can as a rule retain the injection for two or three hours. The tendency to hæmorrhage is arrested, diarrhœa is stopped, and the tenesmus ceases, after the first application; but, as a rule, several injections are necessary to effect a complete cure.

Reference.—[1]*Jour. Amer. Med. Assoc.* 1916, i, 927.

KERITHERAPY.

A new method of thermal treatment, in which a mixture of resin and hard paraffin is used, is described by Barthe de Sandfort.[1] It is claimed that the mixture, *ambrine*, allows great heat (106° to 212°) to be applied to the skin without producing pain, or desquamation of tissue. The hand can easily be borne in ambrine at 158° for a long time. Owing to their anhydrous composition the paraffins retain heat much longer than water, and thus prolonged heat can safely be applied to a part. Slowly cooling, they form non-adherent casts of the part, and also exert pressure. Granulations spring up beneath the cast, and epithelialization proceeds apace. The great heat kills off certain organisms, e.g., *B. pyocyaneus*, and also checks **Hæmorrhage** from cut vessels. When once sterilized by heat, the ambrine remains sterile on remelting at a lower temperature, and thus enables non-sterile dressings to be used over a layer of ambrine. The non-adherent ambrine is a very suitable application for **Burns**, the pain of which is promptly relieved. The universal method of applying resinous paraffin to burns, **Ulcers, Painful Joints, Orchitis**, etc., is as follows: The solidified ambrine is melted by immersing it in a suitable vessel in boiling water. The affected part is then generously painted with the melted wax, or in deep wounds and ulcers it is poured in. Before the wax solidifies, a single thickness of cotton gauze is rapidly applied, and this in its turn is painted with the melted wax; then another layer of gauze is applied, thickly painted, and so for two or three layers. In this way medical cases receive heat which lasts at 100° to 112° for a considerable time, and which exerts some pressure. In surgical cases a non-adherent casing is formed under which repair goes on and which can be readily separated.

For emergency work, ambrine may be used as follows: Some is melted in a large spoon till light vapour rises. The temperature is then 212°, and after cooling slightly the liquid is passed into the wound and covered with some linen or cotton, not necessarily sterile. On solidifying, the impurities are taken up, and now the rest of the ambrine is melted, the first cast removed, and a new one applied as before and kept in place with a bandage.

Reference.—[1]*Med. Press and Circ.* 1915, ii, 580.

MERCURY.

From experimental study on rats, Schamberg, Kolmer, and Raiziss[1] conclude that though individual mercurial preparations show variations in the maximum tolerated dose, yet if calculated for the content

of mercury the variation falls within narrow limits, and the toxicity is directly proportionate to the mercurial content. The inorganic salts are no more toxic than the newer organic compounds. Administered intravenously, the soluble mercurial salts are about four times as toxic as when given intramuscularly. The insoluble mercurial salts are only slowly absorbed when injected intramuscularly, at the rate of about 1 per cent per diem of the amount; hence, after even six or seven weeks, about half the amount injected may still remain unabsorbed at the site of the injection. Therefore, with intramuscular injection of insoluble mercurial preparations at the usual weekly interval there seems risk of accumulation of mercury in the tissues. Examination of the urine is of value, as involvement of the kidneys is one of the early signs of toxic action. The nephritis produced is primarily tubular in variety; but capsular glomerulonephritis is also frequent, and is practically always present in severe cases of tubular nephritis.

Hunt[2] has used intraspinal injections of the *perchloride* in the treatment of seventeen cases of **Syphilitic and Parasyphilitic Conditions**, and states that it is a useful substitute for salvarsan preparations. The dose recommended is $\frac{1}{6}\frac{1}{4}$ to $\frac{1}{5}\frac{1}{0}$ gr., which produces no damage. No changes in the reflexes were obtained, but tremors diminished and beneficial alteration occurred in pain, in the spinal fluid, and in the general condition of the patients.

A paper by Hall Culbertson and Slaght[3] deals with the reaction following the intraspinal injection of mercury. Mercurialized serum, and mercury perchloride or succinimide dissolved in cerebrospinal serum, were used. Fifteen cases seem to have been treated. Pain was noted in all cases, usually fairly severe, localized in the back and extending down the lower limbs. Headache and pain extending down the back were noted in ten cases, insomnia and restlessness in four. Retention of urine, requiring catheterization for the first twenty-four hours but then passing off, was seen in two cases. In all a rise of temperature ranging from 99° to 103° was noted during the first twenty-four hours, and the rise with the salts occurred four or five hours earlier than with mercurialized serum. A constant feature was the increase in the cellular content of the cerebrospinal fluid in the first twenty-four hours, ranging from 300 to 1200 cells per cubic millimetre, with relative and absolute increase in the polymorphs. The increase lasts about seventy-two hours. The authors advise as a dose $\frac{1}{1}\frac{1}{0}\frac{1}{0}$ gr. of mercuric chloride dissolved in 20 c.c. cerebrospinal fluid.

In a military prison Lasage[4] studied a series of fifty cases of syphilis not previously treated. He administered only *mercury salicylate*, injected hypodermically in doses of 1½ gr. at intervals of fourteen days or longer, and found that no effect was produced upon the Wassermann reaction, even although as many as twenty injections were given in some cases. He concludes that if we accept the Wassermann reaction as an indication of the presence of syphilis,

and of value as a guide in the control of the disease by treatment, then it is certainly fair to believe that mercury salicylate used hypodermically in full doses over many weeks has little if any real influence on the disease.

References.—[1]*Jour. Cutan. Dis.* 1915, Dec. 819 ; [2]*Boston Med. and Surg. Jour.* 1916, i, 788 ; [3]*Jour. Amer. Med. Assoc.* 1916, i, 2062 ; [4]*Ibid.* 1915, ii, 1905.

MORPHINE.

Pancoast and Hopkins[1] have investigated by Röntgen study the effect of moderate doses of morphine upon the gastro-intestinal tract of man. These results are obtained by contrasting the Röntgen findings of a control experiment with those obtained after administering morphine either orally or hypodermically. There was no uniformity in connection with dosage. In some cases small doses may produce more marked effects than larger doses in others. While in some the stomach may show no appreciable change from normal, in most there is more or less pyloric spasm, increased peristalsis, and prolongation of the emptying time. In the small intestine morphine causes decreased motility almost uniformly, apparently as a result of a lack of propulsion and not of spasm. When marked it is most noticeable in the upper small bowel. The action on the large bowel is very variable and of little consequence. Oral and hypodermic administration produced practically identical results.

Davis[2] does not believe that the hypodermic injection of morphine and atropine before operation plays any important part in preventing post-operative shock. It has practically no effect upon immunity. Morphine alone, preceding the local anæsthesia, adds nothing to the efficiency of the anæsthetic, and causes post-operative nausea and vomiting in 25 per cent of the patients. By making the patient 'dopey,' it deprives the operator of his co-operation, which is sometimes of value. For these reasons Davis considers that the pre-operative use of morphine should be abandoned, but would retain its administration for relieving post-operative suffering.

References.—[1]*Jour. Amer. Med. Assoc.* 1915, ii, 2220 ; [2]*Ibid.* 1916, Jan. 22.

NEOSALVARSAN. (*See also* Diarsenol, Galyl, Salvarsan.)

J. B. McNerthney and W. B. McNerthney[1] report a case of severe **Trichinosis** of fifteen weeks' standing, with living trichinæ in excised muscle, where the intravenous injection of 0·06 grm. produced an immediate improvement and eventual recovery. Within forty-eight hours less pain was experienced, and the arm, previously flexed firmly, could be extended. In one week the patient was able to sit up, and three days later could walk a little.

Reference.—[1]*Jour. Amer. Med. Assoc.* 1916, ii, 1086.

OPIUM. (*See* Morphine.)

OPTOCHIN. (*See* Ethylhydrocuprein : Quinine.)

OXYGEN.

Tunnicliffe and Stebbing[1] state that it is possible to administer oxygen intravenously. In cases requiring oxygen when inhalation of the gas is impossible or inadequate as to results, the injection may be used. Provided proper precautions are employed, the injections are not dangerous. The apparatus is simple. They use an ordinary cylinder of Brin's oxygen with an endurance regulator. The oxygen used is not pure, but contains a small quantity of nitrogen. By means of screws the flow of the gas is regulated. They found that oxygen gas can be introduced into the veins (most conveniently into a small vein on the dorsum of the foot) in quantity from 500 to 1000 c.c. at the rate of 600 to 1200 c.c. per hour. As a rule, the rate they begin with is 500 c.c. per hour. The more cyanosed the patient, the better is a rapid rate tolerated. As the cyanosis diminishes, the rate should be reduced. During administration the pulse should be watched and the heart auscultated frequently. Loud cardiac murmurs may, and often do, develop during administration. They are not an indication to stop the oxygen, and are due to gas churning in the heart. Irregularity in a previously normal pulse, or increased irregularity in an irregular one, is an indication to stop. It is preceded by a soft systolic murmur at the tricuspid area, and the murmur and the irregular heart action probably indicate acute dilatation of the right side of the heart. The best method is to inject the gas for periods of ten to fifteen minutes with pauses of two or three minutes between, injecting during these pauses just enough gas to prevent clotting in the cannula. The method of treatment is best adapted to cyanosis and dyspnœa due to acute respiratory difficulty and in which the heart is fairly healthy. It is not likely to benefit chronic cyanosis due to myocardial degeneration.

REFERENCE.—[1]*Lancet*, 1916, ii, 321.

PHYLACOGENS.

By a careful study of the blood in regard to leucocytosis, differential count, and opsonic index, Thibaudeau[1] has endeavoured to elucidate the mechanism whereby mixed vaccines (phylacogens) produce immunity. For this purpose he has exhaustively examined a series of five cases of surgical suppuration which received intravenous treatment with phylacogens. In each case the opsonic index was studied for the infecting organism. The general result is as follows. Intravenous administration of phylacogen produced a prompt, marked leucocytosis, with considerable increase in the polymorph count and increase in the opsonic index to the infecting organism. These blood changes are usually, but not always, synchronous with certain characteristic changes (rises) in the pulse, temperature, and blood-pressure, which are followed by a fall to normal or even to subnormal. There is coincident improvement in the clinical manifestations. Mixed vaccines represent multiple antigens stimulating the formation of antibodies. In action they resemble bacterial vaccines, but act more

promptly, as the bacterial derivatives are immediately available and the preliminary splitting up of the bacterial bodies of the vaccine is not necessary. At the same time, owing to their more rapid absorption, the action of phylacogens is more transient.

Reference.—[1]*N.Y. Med. Jour.* 1915, ii, 1239.

PITUITARY EXTRACT.

Both Shamoff[1] and Hoskins[2] state that the commercial preparations of pituitary extracts, if active, usually produce relaxation of isolated intestinal loop preparations in the lower animals. It is therefore not safe to use such preparations for stimulating peristalsis.

References.—[1]*Amer. Jour. Phys.* 1916, No. 39, 268 : [2]*Jour. Amer. Med. Assoc.* 1916, i, 735.

POTASSIUM CHLORATE.

Squire[1] reports a fatal case of poisoning in an infant, age 4½ months, who by mistake was fed with a milk-cream mixture to which, instead of sugar of milk, potassium chlorate had been added. When seen, the infant was cyanosed, with normal temperature, a pulse of 204, and toxæmic appearance. The bowels moved with an aperient, but the urine was greenish-yellow, containing brownish-black particles about the size of a pea. Death ensued without convulsions. Post-mortem examination showed evidence of destruction of hæmoglobin.

Reference.—[1]*Brit. Med. Jour.* 1916, i, 450.

PROTEINS, FOREIGN.

Miller and Lusk[1] have used intravenous injections of foreign protein in the treatment of acute and chronic **Arthritis.** They found that in typhoid fever the intravenous injection of 200 million typhoid vaccine produced certain reactive and therapeutical results. Subsequently they used proteose, giving intravenously from 1 to 2 c.c. of a 4 per cent solution, and obtained the same results as with the typhoid vaccine. Thus 20 per cent of the treated cases terminated by crisis after a single injection ; in about a similar number the termination was by rapid lysis ; and in a third group, approximately again 20 per cent, following a single injection the continuous fever was changed to a very irregular type, which continued till the termination of the disease. The remaining cases reacted by a chill and rise in temperature, but the febrile course of the disease was continued in an uninterrupted fashion. Generally speaking the proteose (in respect of chill, temperature, leucocytosis, and modification of the course of the disease) gave the same results as the typhoid vaccine. They therefore conclude that the sudden alteration in the course of the disease is not due to any specific property of the vaccine, but simply to the introduction of a foreign protein.

This theory was tested in the treatment of acute, subacute, and chronic arthritis of a persistent type which did not respond to simple rest in bed. Such cases received 2 c.c. intravenously of a 4 per cent

proteose solution. The patients react with a chill, rise in temperature, and moderate leucocytosis, and on the day following the injection there is a moderate but definite improvement in the joint symptoms. When their supply of proteose ran short, the authors used a typhoid vaccine in the dose of from 150 million to 75 million intravenously. This produced the same reaction as when used in typhoid patients, except that the leucocytosis was more marked, especially in the acuter types of arthritis. The chill came on within five to sixty minutes, and was followed by a profuse sweat lasting several hours. When repeated daily injections were used, the chill became shorter and less marked. The maximum fever is reached, not at the period of chill, but three to four hours afterwards, and in acute arthritis may attain 105°. With repeated injections the febrile response is diminished. Nausea and headache were practically constant after early injection. As regards the therapeutic results obtained, in three out of ten cases of **Acute Articular Rheumatism,** immediately following a single injection of 150 million typhoid vaccine the fever terminated by crisis, and the joints were apparently normal in from twelve to twenty-four hours. The cure was permanent. The remaining seven cases were greatly benefited by a single injection, but not permanently, and three or four injections were required to remove all symptoms. The results were not very permanent, as relapses were frequent.

The present practice in all acute cases is to give four or five daily injections to prevent relapses. In subacute arthritis of from three to nine months' duration, satisfactory results were obtained—after a single injection great relief, and after three or four injections greater freedom of movement. It is doubtful if the results will be permanent, but there was no marked recurrence within the first month. In acute **Gonorrhœal Arthritis** there was only moderate benefit, but in chronic gonorrhœal arthritis encouraging results were obtained from repeated injections. It is difficult to explain the results. In rheumatic cases the joints improve but complications (endo- and pericarditis) are unaffected. In gonorrhœal arthritis the joints may improve while the discharge is increased. Possibly the localized immunization of the joints may indicate that as a result of the injections the joints become desensitized. The authors claim that their work affords further proof of the non-specificity of vaccine except for preventive inoculation.

Reference.—[1]*Jour. Amer. Med. Assoc.* 1916, i, 1756.

QUININE.

Bonnot[1] has used quinine enemata after **Rectal Operations,** and claims that it is a satisfactory anæsthetic, obviating the use of morphine. After completing such operations as cauterizing hæmorrhoids, or curing fistula or fissures, he inserts into the rectum a soft rubber tube 6 in. long and ¼ in. in internal diameter. Through this he injects 10 gr. quinine muriate dissolved in 2 oz. of water, and by clamping the rubber tube this is retained for one hour. The injection

is repeated once after six hours, and then the tube is withdrawn. Next day 1½ oz. of castor oil is given. There is an absence of pain and tenesmus even when the bowels move on the second day.

MacGilchrist[2] has investigated the relative therapeutic activity in **Malaria** of the more important cinchona alkaloids and their derivatives hydroquinine and ethyl hydroquinine (optochinin). He finds hydroquinine hydrochloride the most active ; then come cinchonine sulphate, quinine sulphate, and quinidine sulphate, for all practical purposes of equal value. Next in order of efficiency he puts optochin, then cinchonidine sulphate, and least efficient of all quinoidine. An investigation of side-actions showed that buzzing in the ears was most frequent with quinine and quinoidine, amblyopia with quinine and cinchonine, diarrhœa with cinchonine if administered for over a week, and nausea with quinoidine. Cinchonidine, even in large doses, produced no bad effects.

Therapeutically the effect of these drugs is to arrest sporulation. The first to disappear from the blood are sporulating forms, next to become rare and disappear are small rings, and later the half-grown parasites. The last forms to remain in the blood are full-grown schizonts and gametes. The antimalarial action is greatly assisted by good health of the subjects. At certain stages the parasites are more resistant to the alkaloids, and to produce complete disappearance the vulnerable stage in the life cycle must be reached. Minimal lethal doses for vulnerable stages of benign tertian, malignant tertian, and quartan parasites are respectively about 0·1, 0·12, and 0·2 grm. per 70 kilos of patient's weight. Granted sufficient dosage is employed, the average number of hours required to free the peripheral blood of parasites is roughly proportionate to the duration of the life cycle of the parasite, and in any individual case depends on the time required for the vulnerable stage in the developmental cycle being reached. The small dose required to free the peripheral blood of asexual forms is interesting. Thus as in practice the dose is sufficient, failure to cure probably depends on too short a spell of treatment. When gametes are present, it is necessary to give the quinine daily for a period equal to the life-history of the individual gamete. Gametes seem to be a last defence against total extermination of the parasite, and are produced only when the asexual forms are becoming exhausted or exposed to inimical surroundings. In ordinary doses the cinchona alkaloids have little influence on developed crescents, but apparently check production of crescents if administered before these bodies have appeared in the peripheral blood, and greatly shorten the period during which these bodies, having made their appearance during treatment, can be found in the peripheral blood. Marked parallelism between laboratory and hospital findings occur with the natural alkaloids ; but the artificial alkaloids, which are perhaps not so stable, fail to show this harmony.

Suggestions are made as regards the manufacture of cinchona derivatives. Use bark containing as little quinoidine as possible.

Extract quinine for use as such and to prepare hydroquinine. Issue the remaining alkaloids as residual alkaloid, which should contain as little quinoidine as possible, but have a large content of quinine, cinchonine, and quinidine.

REFERENCES.—[1]*Med. Rec.* 1915, ii, 786; [2]*Ind. Jour. Med. Research*, 1915, ii, 1.

SALINE, NORMAL.

In an article discussing the uses and abuses of normal saline solution, Willmoth[1] lays stress on the following points. In dealing with shock not due to hæmorrhage, the solution should be given intravenously at a temperature of 120° in small quantities often repeated rather than in one or more somewhat larger amounts, to avoid overwhelming the heart: but in cases when loss of blood has necessitated refilling of the arteries, larger quantities must be used, which may be safely introduced at the rate of 1 oz. a minute. However introduced—intravenously, hypodermically, or by the rectum—it is essential to use the solution as hot as the hand can bear (110° to 120°) if the maximum stimulation to the circulation is to be attained. Not more than 30 to 40 oz. should be introduced at any one time. Under no circumstances should saline solution be used in apoplexy, arteriosclerosis, pulmonary œdema, or dilated right heart. In threatened sudden death and sudden collapse from chloroform or other narcosis it is too slow in action.

REFERENCE.—[1]*Amer. Jour. Surg.* 1916, i, 147.

SALVARSAN. (*See also* DIARSENOL, GALYL, NEOSALVARSAN.)

Douglas and Colebrook[1] find that in watery solution both salvarsan and neosalvarsan possess a very distinct bactericidal power against staphylococcus, provided the strength of the solution is 1–6000. When dissolved in blood or serum the bactericidal action is slightly weakened. The administration of neosalvarsan renders the blood fluids markedly bactericidal for a short time, reaching a maximum in about one hour and diminishing rapidly in the third and fourth hours. As heating the serum does not impair the bactericidal action, it depends probably on the presence of some arsenical compound in the blood. Though ordinary doses of neosalvarsan confer this temporary bactericidal power on the blood fluids, salvarsan in ordinary therapeutic doses fails to produce a similar action, but seems to confer some property of inhibiting the growth of organisms.

Ehrlich had prepared a new modification of salvarsan which he called *sodium salvarsan*. In the fixed form it appears to be practically the compound obtained on adding alkali to salvarsan as in preparing the original infusion. The sodium salvarsan is a yellow powder, darkening on exposure to air and then becoming toxic and insoluble. When freshly opened the powder is readily soluble in water, giving an alkaline solution suitable for intravenous but not for subcutaneous administration. Wechselmann and Dreyfus[2] have both used the new preparation extensively. They warmly recommend it as thera-

peutically efficacious, and less toxic than either salvarsan or neosalvarsan. They state that it can be used where the older drugs were contra-indicated by chronic nephritis, optic neuritis, apoplexy, diabetes, etc. They recommend two or three injections a week, and as a rule from 3 to 7 grms. in all are required, but they have given as many as forty to fifty injections. The individual doses run from 0·3 to 0·6 grm., and can be given either as a concentrated solution in 30 c.c. of distilled water, or as a weaker infusion, using 10 c.c. of 0·4 per cent saline for each 0·1 grm. of the drug.

REFERENCES.—[1]*Lancet*, 1916, i, 181 ; [2]*Münch. med. Woch.* 1915, 177, 178.

SODIUM CITRATE.

Since sodium citrate has come into use as a ready means of preventing the clotting of transfused blood, it is of some importance to discover what is the result of repeated intravenous injections of sodium citrate on man. According to Lewisohn, the toxic dose is 1·5 grm. for a dog of 11 lb., so that according to this ratio a man of 110 lb. weight would require 15 grms. to produce a fatal effect. As a rule the amount used in an intravenous transfusion is about 2 grms., as 100 c.c. of a 2 per cent solution of sodium citrate is mixed with 900 c.c. of blood. Gaubat[1] finds that this proportion is rather small to prevent clotting, and recommends the use of the same proportion of 2·5 per cent solution of sodium citrate as more reliable in preventing clotting. He thinks this amount of sodium citrate (2·5 grm.) is not harmful, as he has found that repeated intravenous injection of 1 to 2 grms. in the form of a 2 per cent solution in distilled water produced no harm in a series of four patients, one of whom received 19·5 grms. in the course of five months. None of the four patients showed any signs of renal irritation, but occasionally slight fever and chill followed an injection.

Lewisohn,[2] on the other hand, found that a 2 per cent solution in the ratio of 1 part citrate solution to 9 parts blood prevents coagulation.

REFERENCES.—[1]*Jour. Amer. Med. Assoc.* 1916, i, 1343 ; [2]*Amer. Jour. Med. Sci.* 1915, ii, 886.

SODIUM SULPHATE.

Arnold[1] advises the administration of sodium sulphate in **Infantile Diarrhœa.** After a preliminary dose of castor oil, the sodium sulphate is given in doses of 5 to 15 gr. every two or three hours for children under one year of age. Milk is generally excluded from the diet for a few days.

REFERENCE.—[1]*Brit. Med. Jour.* 1916, i, 49.

SOYA BEANS.

The seeds of *Glycine hispida* a leguminous plant, are used in medicine as a suitable diet for **Diabetic** patients, as they contain no carbohydrate but are rich in protein and fat. According to W. G. Smith,[1]

they also contain an enzyme, urease, which can be used for the detection and quantitative **Estimation of Urea.** Either the powdered bean or the separated ferment, urease, may be used.

REFERENCE.—[1]*Dublin Jour. Med. Sci.* 1916, 293.

SULPHUR.

Le Tanneur[1] recommends soaking the feet in 0·2 per cent solution of sulphide of potash daily for fifteen to twenty minutes in **Wounds of the Foot.** In hyperidrosis such wounds do not heal rapidly, as the edges often become macerated and delay healing; but under the sulphide of potash treatment healing is obtained in a few days.

REFERENCE.—[1]*Jour. de Méd. et de Chir. Prat.* 1915, Oct. 25.

THYROID EXTRACT.

Beebe[1] advocates the hypodermic injection of a preparation of human th roid gland as superior to animal extracts in therapeutic efficacy in certain cases of **Hypothyroidism.** It has been used with success in myxœdema and cretinism, and in certain disturbances of menstruation which Beebe connects with hypothyroidism. The preparation of the human glands is briefly as follows. The glands, freed from connective tissue, are ground to pulp and covered for forty-eight hours with 8 to 10 volumes of physiological saline solution. The extract is filtered through gauze and filter-paper; the filtrate, faintly acidified with acetic acid, is heated to 44° C. on a water-bath to coagulate nucleoprotein and globulin which are removed and washed by decantation and then redissolved in physiological saline solution made faintly alkaline with sodium bicarbonate, which is then filtered, and on acidifying the filtrate with weak acetic acid the precipitate is again obtained and washed by decantation. For use, the precipitated washed nucleoprotein is dissolved in faintly alkaline NaCl solution, and the nitrogen content is determined. It is then sterilized by boiling. The dose seems to be about 1 to 2 c.c. daily of a solution containing 0·33 to 0·5 per cent.

REFERENCE.—[1]*N.Y. Med. Jour.* 1916, ii, 445.

VACCINES. (*See also* PHYLACOGENS; PROTEINS.)

Wohl[1] has employed *autosensitized autogenous vaccines* with success. The vaccine is prepared if possible from primary cultures and subjected to as little artificial change as possible. Sterilization is effected by heating to 56° to 58° C. for thirty to thirty-five minutes. The sensitization is accomplished by immersing the vaccine in the patient's own serum, and to avoid any risk of removing antibodies by subsequent washing in saline solution, this procedure is completely abandoned, and the entire mixture of the patient's serum and vaccine is injected.

Strouse and Frank[2] have tested the comparative action of autogenous vaccines of the nasal organisms and pollen treatment in cases of **Hay Fever.** The results show that there is little difference, the vaccine seeming to afford almost as much relief as the pollen treatment. In a few cases where both pollen treatment and subsequent

vaccine inoculations were employed, the results were exceptionally good and seem worth testing further. The use of the vaccine depends on the assumption that hay fever is possibly a combination of hypersensitiveness to pollen protein dependent on a bacterial subinfection of the nasal mucous membrane. (*See also* HAY FEVER.)

Robert Harris[3] advises the rapid desiccation of the infected rabbit cord at a low temperature in vacuo as a more rapid and permanent method of preparing active virus for **Rabies.** The method is briefly as follows: A thick paste of brain and cord frozen with carbon-dioxide snow is ground in a mortar until pulverized, and then is desiccated in a Schibler jar over sulphuric acid at a temperature of −18° C. by immersing in a mixture of salt and water. The cord is desiccated in thirty-six to forty-eight hours, and if kept in vacuo at 0° C. no appreciable diminution in activity occurs for several months. By the use of such cords more rapid immunization is obtained than with Pasteur's technique, the average time for complete administration of treatment being less than half that required for the older method. Harris's modification has already been used in 115 people, of whom only two died of hydrophobia, and in both these cases there was hardly time for the antirabic antibodies to be found in the patients' tissues before the development of the disease.

Bristol[4] advocates toluol as a suitable germicide for the sterilization of vaccines of non-sporogenous Gram-negative bacteria. The organisms are grown on agar slants, and then enough toluol is poured on to cover the surface of the cultures completely. After acting for twenty-four hours the toluol is poured off and the last traces are removed by heating the culture tube in the incubator for a short time. It is claimed that this method gives as 'live' a vaccine as it is possible to obtain with dead organisms.

REFERENCES.—[1]*Med. Rec.* 1916, i, 770; [2]*Jour. Amer. Med. Assoc.* 1916, i, 442; [3]*Ibid.* ii, 723; [4]*N.Y. Med. Jour.* 1916, ii, 460.

VENESECTION.

Lawrence[1] advocates venesection in cases of: (1) **Valvular Disease of the Heart** with decompensation, right-sided dilatation, pulmonary stasis, and œdema; (2) **Cardiorenal Conditions** with hypertension, cardiac hypertrophy, and failure of the circulation, with impending uræmia; (3) **Hyperpiesis.** Venesection is not a dangerous measure, as the amount of blood withdrawn is under control. In dilatation of the heart, renal toxæmia, hypertension, or a combination of these conditions, it may be expected to act more quickly and surely than drugs. It lowers blood-pressure and, at the same time, produces a more efficient circulation, in hypertension, but does not lower a previously normal arterial tension. It may also have an effect upon the viscosity of the blood. Venesection should never be performed in the absence of definite indications, but should not be withheld till the hopes of success from every measure is gone. If required, repeated venesections do not impoverish the blood.

REFERENCE.—[1]*Boston Med. and Surg. Jour.* 1916, i, 263.

RADIO-ACTIVITY AND ELECTROTHERAPEUTICS.

BY

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RADIOGRAPHY IN WAR.

In the Medical Annual for 1915 we made a special feature of the localization of foreign bodies. A large number of papers were referred to, and it was pointed out that whilst the surgeons required simplicity, a large number of the methods advocated were too complicated even when they were efficient. The experience of another year of war has not brought forward much that is new in this field of work, but advances have been made, chiefly in the direction of modifications of methods and apparatus already in use. Some radiologists have attempted to improve the apparatus and the technique for the actual finding and removal of foreign bodies. Some surgeons have criticized and endeavoured to improve upon *x*-ray methods. It has become evident that the subject can be approached from two points of view —one, that of the *x*-ray expert, who knows nothing, or very little, about surgery and anatomy, and is fully aware of his deficiencies; the other, that of the surgeon, who knows all about surgery and anatomy and little about radiography. It must be remembered that *x*-ray work in war is not limited to the demonstration and localization of foreign bodies, but that the examination of bone injuries of all kinds, and their repair under treatment, is equally important.

Grey Turner[1] takes a broad view of *x*-ray work, evidenced by his statement that "you cannot see much of military surgery without appreciating the enormous value of the *x* rays." His remarks on foreign bodies should be read by all *x*-ray specialists, and by all surgeons, and by those who have at the present time to be surgeons whether specially qualified or not. He lays down the law "that no operation for the removal of a foreign body should be performed without a previous *x*-ray examination." Another point made is that plates should be taken of everything, even when a foreign body can be felt, the reason being "that it is wonderful how many revelations one gets, even in cases which are apparently most trivial."

Lee[2] writes on the removal of *intracranial foreign bodies* under *x* rays. He endeavoured, but failed, to remove a piece of shell by means of an electro-magnet capable of lifting fourteen pounds. He then localized the position by means of a probe passed into the

occipital lobe under screen observation. Vilvandré,[3] on radiography in gunshot wounds of the skull, maintains that no operation on the skull should be performed before an *x*-ray examination, and he also points out an important fact, namely, that good radiographs will not always demonstrate a fracture of the skull, and that clinical symptoms must not be overlooked when this is the case. The illustrations are good. The same author,[4] discussing the movements of foreign bodies in the brain, shows the liability to such movements in the midst of damaged brain matter, and several radiographs taken at intervals demonstrate how much movement can take place in a short time. This is an important observation, and suggests that in brain cases localization should be done immediately before any operation. In a further communication[5] he makes interesting observations on radiography as illustrating that the velocity of the rifle bullet has a determining factor in the extent of an injury, and that the damage done is dependent on this rather than on the texture of the bone. If the bullet is travelling very fast it may go clean through a bone without fracturing it.

Morison[6] draws attention to the *x*-ray appearances caused by *gas in the tissues*. He divides these cases into two groups : (1) Those with localized gas-formations, in which the *x* rays showed the bubbles long before they could be diagnosed by other means ; (2) Those of true gas gangrene. In these the gas formation is very rapid, and spreads along the muscle sheaths, etc. The radiographs of this latter condition (the first published in this country) are exceedingly fine and very remarkable (*Plate I*). Davis[7] has found in all cases where a 'halo-line' shadow shows about a foreign body that at the operation, etc., there has been clinical evidence of gas- and pus-forming organisms. He considers the *x*-ray evidence of great importance, and advises an examination not only in recent cases, but also in those when a foreign body has been allowed to remain and from which clinical symptoms develop later on.

References.—[1]*Brit. Med. Jour.* 1916, i, 401 ; [2]*Ibid.* 447 ; [3]*Arch. Rad. and Elect.* 1916, *Feb.*, 306 ; [4]*Ibid.* 1916, June, 22 ; [5]*Ibid.* 1915, Nov., 192 ; [6]*Ibid.* 1915, Dec., 222 ; [7]*Surg. Gyn. and Obst.* 1916, i, 635.

LOCALIZATION OF FOREIGN BODIES.

Very little really new work has appeared during the past year upon this subject. Barclay[1] has endeavoured to elaborate an instrument (*Fig.* 1) for the purposes of localization and removal of foreign bodies under the screen. A small screen is fixed above two blades, which, after a preliminary skin incision, are worked down to the foreign body through the tissues under the direction of the *x* rays. There is an electric circuit and bell in connection with the instrument, and when the insulated blades grasp the object, electrical contact is set up and the bell rings. The metal fragment is then withdrawn in the jaws of the blades. A number of cases are quoted in which the author successfully removed various metallic bodies. Whilst there seems

PLATE I.

ELBOW AND FOREARM SHOWING GAS GANGRENE.

Dr. J. M. W. Morison

to be a field for such an instrument, it is hardly likely to come into general use, as it requires the combination of an *x*-ray expert with a surgeon, or the user should be both: it is nevertheless a distinct advance in both *x*-ray technique and in operative procedure.

Working on somewhat similar lines, but without the electric indicator, Hernaman-Johnson[2] has designed a sterilizable head fluoroscope

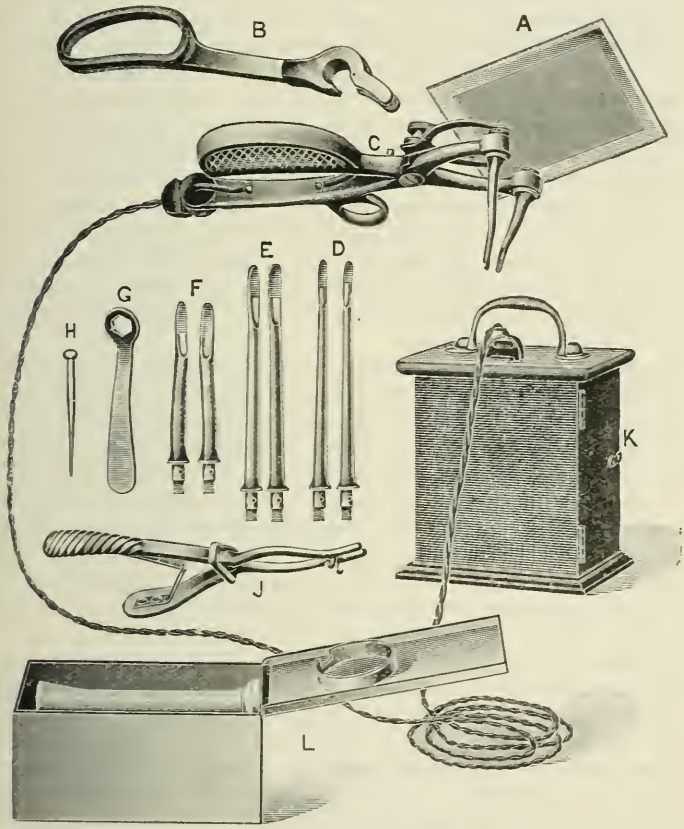

Fig. 1.—Barclay's bullet extractor. A, Screen. B, Extra handle. C, Jaws and Prongs. D, E, F, Extra prongs. G, Spanner. H, Director. J, Retractor. K, Battery and bell. L, Sterilizing box.

for use with a set of forceps having blades at right angles to their handles. By an ingenious device the surgeon, without removing the fluoroscope, can, by raising a kind of door, change at will from *x*-ray to direct vision. Fitted inside are lenses which can be used to magnify the shadows of small metallic fragments.

Bergonié[3] advocates the practice of surgical radioscopy in an operating-room illuminated only by intense red light. This has the

advantage that no interval is necessary between the suppression of the light and the screening ; the operative procedures can go on under the red light, and then immediately the surgeon can utilize x rays and the screen image without waiting for the eyes to become used to a darkened room. The light used is that obtained from 20 lamps of 25 c.p. filtered through two thicknesses of the ruby glass of commerce.

An entirely new suggestion for localization emanates from Shenton.[4] Beneath the table the tube is moved a short distance, and the length of excursion of the shadow on the screen is noted. The screen is now raised until the excursion has doubled itself. The distance the screen is raised is the depth of the foreign body. No measurements are required. This sounds exceedingly simple, but experience alone can demonstrate its actual value. Carver[5] arrived at the same principle independently, and publishes a description of the manner in which he carries it out, and the apparatus he invented for the purpose. The great advantage claimed is that no measurements are necessary, and no particular distance of tube shift. The upright bar of the apparatus which carries the screen is graduated, and is fitted with a spring glider ; the height to which the screen is raised, i.e.. the depth of the foreign body, is read off on the scale.

Stansfield[6] advocates a method which can hardly be described as original. By means of a very simple piece of apparatus (see the original paper) he marks a spot on either side of the part under examination. Then he rotates the part into another position and makes two more marks. The point of intersection of the lines indicates the position of the foreign body. [The fallacy in this method has already been pointed out in the MEDICAL ANNUAL, 1916, p. 44. If the position of the limb is altered for the two observations, then, owing to the difference of pressure on the fleshy parts, the foreign body is no longer a fixed point to compare in the two positions.—C. T. H.]

Richards[7] describes a method which he states has not been published, and is so simple and practical that it deserves wider recognition. It is a combination of Hernaman-Johnson's method of marking a spot on one side and then on the other, with Shenton's method of parallax.

Hallam[8] has invented a couch and a system of localization which he describes as accurate, rapid, and simple to work, and which provides a stereo-negative from which the depth of the foreign body may be determined. Two lead crosses are placed on the skin, and instead of making a double exposure on the same plate, two separate exposures are made on the two halves of the plate, which is carried in a frame allowing of accurate movement of the plate and protection of the half not being exposed. The depth of the foreign body from the crosses is directly ascertained from a scale engraved on glass. It can be worked from below up, or from above down. Without claiming that the idea is original, it is certainly a new adaptation of the triangulation method. As at the same time it combines accurate stereoscopy with skin marks and depth measurement, the whole being

carried out by inexpensive and simple apparatus, it has obvious advantages over many of the methods advocated by others.

Crymble[9] points out that ordinary methods for the localization of foreign bodies do not go far enough ; but that these results should be combined with sectional anatomy, and then the actual organ or tissue where the foreign body actually is lodged could be determined. The paper also deals with the reconstruction of the track of the wound, showing the various tissues, etc., through which the missile has passed. The author is able by the means advocated to construct very complete radiographic reports, which, when dealing with brain and abdominal wounds, are of especial importance. The method of combining stereoscopic head radiographs with stereoscopic diagrams for mapping out the different parts of the brain is clever and ought to be of practical use. In abdominal radiography the value of a series of diagrammatic sections through the body is clearly proved, and the diagrams themselves are good. This paper is a great advance in the direction of describing with exactitude the position of foreign bodies in various organs, is beautifully and extensively illustrated by diagrams, radiographs, and drawings, and forms a valuable addition to *x*-ray literature.

Fullerton[10] has recently been using the opaque ureteral catheter combined with stereoscopic radiography to help in the determination of the exact position of foreign bodies in relation to the kidney ; he details in full a case in which, by this method, a bullet was located as being behind the kidney or ureter at the level of the lower pole, the subsequent operation proving this to be correct. The idea is new, and seems to have distinct possibilities.

The exact localization of a foreign body in an eye has always been an operation requiring great care and accuracy, and with the large number of such cases caused by the war, anything to simplify existing procedures is welcome. Two chief methods are those of Mackenzie Davidson and Sweet, and a full description of the 'improved localizer' of the latter,[11] which largely eliminates the human element of error, should be referred to. The paper is illustrated by drawings of a remarkable and exact instrument. George[12] has endeavoured to improve upon the proceedings for determining the exact position of the foreign body in Davidson's methods after the plate has been taken. The description is involved, and readers should refer to the original paper, but the underlying idea of the author is the elimination of most of the thinking required and the making of the operation more mechanical, while also saving much time.

Stenning[13] suggests the use of a special localizing mat consisting of a number of pieces of lead wire embedded in an *x*-ray-transparent material ; in screening the patient this mat is placed on the surface of the couch. The chief advantage claimed is that the fluorescent screen need not be held horizontally and does not have to touch the patient. Although said to be a 'simple' plan, the description of it in the paper seems scarcely to bear this out. Other papers on

this subject which may be referred to are by Harvey,[14] Jordan,[15] Hirtz and Gallot,[16] Morin and Beelin,[17] Ribaut and Brocq.[18]

REFERENCES.—[1]*Arch. Rad. and Elect.* 1916, April, 359; [2]*Brit. Med. Jour.* 1916, i, 826; [3]*Arch. d'Elect. Méd.* 1915, No. 398, 1916, No. 401, and *Arch. Rad. and Elect.* 1916, July, 71; [4]*Lancet*, 1916, i, 589; [5]*Arch. Rad. and Elect.* 1916, May, 423; [6]*Lancet*, 1915, ii, 1245; [7]*Brit. Med. Jour.* 1916, ii, 15; [8]*Arch. Rad. and Elect.* 1915, Dec., 235; [9]*Brit. Jour. Surg.* 1916, Oct., 234; [10]*Ibid.* 278; [11]*Arch. Rad. and Elect.* 1916, Aug., 100; [12]*Ibid.* Mar., 347; [13]*Ibid.* 1915, Nov. 205; [14]*Jour. Röntgen Soc.* 1916, April, 35; [15]*Arch. Rad. and Elect.* 1915, Nov., 188; [16]*Jour. de Rad. et d'Elect.* 1915, 709; [17]*Ibid.* 1916, 31; [18]*Ibid.* 79.

NEW APPARATUS.

Gunstone[1] publishes the results of his experiments made with a view of using the inverse current as given by an induction coil operated by a mercury interrupter. This is an important advance, as hitherto the mechanical devices introduced have all aimed at the suppression of this current. The principle of the new idea is that the coil is provided with two primary windings with a central tapping, and the interrupter is fitted with four contacts so arranged that when the jet leaves one contact and passes on to the next, the current flowing in one primary winding is broken, and then made again in the other. For full details of the apparatus and theory the original paper should be referred to, in which are a series of photographs to illustrate the results obtained. It is claimed that even at full output the heating of the tube is considerably less than in the case of a transformer, and valve tubes are entirely dispensed with. Further, it is not necessary to build coils specially designed to give a minimum of inverse current. Indeed, they can be built to give a maximum. This means that the coil can be made as large as anyone desires, and furthermore can be run at its full output. The author adds that although the actual use of the inverse current may not be of any great advantage, in the course of his work it was found easier to use it than successfully cut it out. The possibilities which this discovery offers to *x*-ray workers must be very evident.

Mackenzie Davidson,[2] experimenting in the same direction, has invented a new commutator attachment for his own interrupter, a very simple piece of apparatus, by means of which the make current is utilized and the current made unidirectional. Breaks are being constructed with this attachment which will allow of 50 ampères being used on the primary, and the author is of opinion that the result will be that *x*-ray workers will have a means of exciting tubes which will enable work to be done with a coil which has hitherto been impossible.

REFERENCES.—[1]*Jour. Rön'gen Soc.* 1916, July, 62; [2]*Proc. Roy. Soc. Med.*, Electrother. Sect. 1916, 55.

THE COOLIDGE TUBE.

Coolidge[1] publishes a summary of physical investigation work in progress on tubes and accessories which is full of useful information on the making of tubes. Some experiments on a hooded tube in

which a cylindrical cap or hood of molybdenum was attached to the target of the tube seem promising. This allows the cathode rays to enter through a small hole in the front, and the *x* ray to emerge through a second hole in the side. Better definition, and reduction of the danger to the operator, are two of the advantages. Other experiments with a view to the water-cooling of the target resulted in a tube running for forty-two hours consecutively, carrying a current of 100 ma., whilst another ran for sixty-two hours. Advances have been made in the direction of the control of the filament temperature. Instead of the storage battery, a specially designed transformer is used in conjunction with the usual filament current transformer; then the filament current transformer is controlled by a dial switch which controls a resistance connected in series with the primary of the filament current transformer. This should mean a great simplification in the working of the tube. Many other points are dealt with in a paper which will repay a careful study.

Writing on experiments and experiences with the Coolidge tube, Knox[2] details the results of a large number of experiments on the exposure of a penetration gauge and a piece of a dried femur. A very large number of these experiments, fully illustrated, are a valuable contribution to the exact knowledge of the *x*-ray capabilities of the tube. This paper is a long one and, in addition to the above, describes the author's new rotating tube-stand and his methods of estimating doses. It, and the discussion which followed, are full of new material.

REFERENCES.—[1]*Amer. Jour. of Röntgen.*, 1915, 881; [2]*Proc. Roy. Soc. Med.*, Electrother. Sect. 1916, 98.

X-RAY DIAGNOSIS.

Œsophagus.—Hirsch[1] gives a very full and detailed account of the *x*-ray examination of this organ, and his illustrations of the various conditions met with are striking. He condemns all those methods of examination which depend upon the insertion into the lumen of sounds, bougies, rubber bags filled with bismuth, and so on; and states that the simple method of the administration of a bismuth (or barium) food will give all the information necessary without undue inconvenience to the patient. Foreign bodies, lesions causing stenosis, spasm, benign and malignant stricture, and other and rarer conditions are all dealt with in full, and a large bibliography is added. The paper may be said to be a complete monograph on the subject, and valuable for reference.

A case showing the value of radiography in the diagnosis of *cardiospasm* is reported by Wakeley.[2] Symptoms had gone on for about sixteen years before an *x*-ray examination was made, and this at once made the diagnosis and indicated the proper line of treatment. This paper is illustrated by diagrams from radiographs by Knox. A very complete account of a similar case is given by Matas,[3] and his radiographs show that the œsophagus was so dilated as to hold practically all the food which the patient took during the day. An ingenious

method of treatment was adopted, with the result that, as shown by radiography, the œsophagus contracted and food entered the stomach normally. [The treatment of these by no means rare cases is usually so unsatisfactory, and the result in this case so good, that we would call special attention to this paper.—C. T. H.]

Stomach and Duodenum.—Metcalf[4] has made a stomach meal in which 75 per cent of pure barium sulphate is mixed with a pabulum of 25 per cent of cocoa, arrowroot, desiccated milk, etc. All that is then required to prepare the meal is to rub it into a paste with a little cold water, add the desired quantity of water, and boil it. This meal is said to be pleasant to take. It can also be used for rectal examinations.

Willox[5] has made a prolonged study of the shape, size, position, and motility of the stomach in children, by means of screen observations. This is a very complete and detailed research, beginning with a comparison of the different opaque materials, and followed by the recording of the results in a large series of cases. In his summary he notes that the stomachs emptied in from three to four hours, the average time being three hours and three-quarters, when the meal administered was four level teaspoonfuls of barium sulphate in a 6-oz. feed of semi-solid consistence. He considers barium sulphate the best opaque substance, but to produce as deep a shadow as bismuth, half as much again must be used. He thinks there is no *x*-ray evidence to show that bismuth forms any coating for the intestinal mucous membrane.

Matas[6] gives a complete account of **Hair Balls** in the stomach, especially from the point of view of radiography. A full account of the literature is included in the article, 73 cases having been recorded since Schoenbron first removed one by operation in 1883. An account of a case under the author's own observation is given.

Holmes[7] reports on the results of the *x*-ray examination of 730 cases of stomach and duodenum seen in one year. Of these, 144 went to operation, and an analysis of the findings as compared with the *x*-ray diagnoses is of interest. The technique is given in full detail, dependence upon the screen appearances being the method of choice, as giving the best chance of obtaining correct Röntgen findings at the least possible cost—a consideration in hospital work. Two points made are: (1) In the examination of the stomach and duodenum, any defect which can be reproduced on a plate can be seen in some of the various positions and phases; (2) He believes that cases of malignant disease of the stomach rarely have sufficient symptoms to make them seek help (and therefore they are not *x*-rayed) until the lesions have become inoperable.

According to Carman,[8] 95 per cent of **Gastric Carcinomas** are discoverable by radiography, a percentage not approached by any other process of examination. When this is combined with all the other methods, a net is formed through which few cancers can escape. The Röntgenologic manifestations of cancer include departures from the normal contour, pylorie action, peristalsis, motility, flexibility,

mobility, position and size of the stomach; all these points are discussed fully as to their importance and to their demonstration. In discussing the all-important question of early diagnosis, the statement is warranted that, next to the exploring finger of a trained surgeon, x rays will reveal more cancers in the early stages than will any other diagnostic means. The paper concludes with a detailed account of twelve cases illustrated by radiographs, and is one of much thought and great value.

A profusely illustrated paper by Case[9] is interesting as dealing with the x-ray study of cases following on gastric and intestinal operations. In acute small-bowel obstruction, post-operative, it is pointed out that it is unnecessary to give an opaque meal, as the observations are made possible by the gas distention of the intestine, the appearances being characteristic; and the distribution of the gas areas is of the utmost importance in deciding upon the seat of the obstruction. Observations on the findings after gastro-enterostomy are novel. In the examination of forty cases after ileocolostomy, in which the operation, without being a failure, was nevertheless not altogether satisfactory, the findings are of extreme interest. Case shows that incompetency of the ileocolic stoma (as shown by the enema), regurgitation of ingested food, and ileal stasis, are all of common occurrence. Following the barium meal, there has been in every case, without exception, retrograde peristalsis, carrying barium in an oral direction as far as is possible from the rectum. The author concludes that in a very considerable percentage of cases in which the operation of ileosigmoidostomy is performed for the relief of intestinal stasis, especially ileal stasis, the end-result is infinitely worse than if the patient had not been operated upon, at least as far as the ileal stasis and the patient's comfort are concerned.

At first somewhat sceptical, Carman[10] now considers that Cole's bulbar deformity of the duodenum is one of the most valuable x-ray indications of **Duodenal Ulcer.** During the period in which he has tried the serial method, with modifications, the diagnosis of duodenal ulcer has been confirmed at operation with fewer exceptions than before, and fewer ulcers have escaped x-ray diagnosis. This paper compares serial radiography with the other Röntgenologic signs of duodenal ulcer in a fair and logical manner, and the author is brought to the conclusion that we should not pin our faith to any single method of examination, but should use every technique which offers help, and weigh the results as a whole.

In a paper on the duodenum, Case[11] describes his technique in a comprehensive manner, and as this is quite different from that usually adopted it should be noted, especially as the many illustrations, in addition to being of super-excellence, demonstrate the various points made in a most striking way. The essentials of the technique of the meal are that he begins, in the standing position, by the administration of a third of a glass of water into which has been stirred a heaped teaspoonful of barium sulphate, and notes the screen findings. Following

this the patient is given first 1 oz. of barium in a glass of hot malted milk, and then 1 oz. in a glass of cold buttermilk. Further observations are made in the standing position, the lying-down position, and finally with the patient lying on his right side with the screen in front and the tube at the back. A point of great interest made is that the 'so-called writhing duodenum,' believed by Jordan to be pathognomonic of duodenal obstruction, is demonstrable in almost every case of a thin patient when examined in the supine position and given the large meal suggested by Jordan. Amongst other conditions shown are radiographs of duodenal diverticula which went to operation, and two in which the barium entered a dilated ampulla of Vater. This paper is the most valuable one on the subject that has hitherto been published.

Colon.—Walsham and Overend[12] publish an article on the movements of the colon, recognizing three: (1) Contractions of the circular muscle, which are movements of mixing the contents, and which cause blurring of *x*-ray shadows in exposures of over a few seconds; (2) True peristalsis, a wave of contraction preceded by a wave of dilatation; (3) A third in which solid movements of food occur *en masse*. They consider that the occurrence of antiperistaltic movement in man as a physiological actuality is still a matter of doubt. The clinical anatomy and physiology of the colon are considered in full. This paper should be read with one by Barclay,[13] in which the author concludes that the normal movement of fæces in the large intestine is by mass movement, in which a large column is moved through a long section of the colon in a few seconds. Such mass movements are believed to occur three or four times a day, and do not take place in the cæcum. Many other points are dealt with in a paper which is full of interesting observations and suggestions.

Glasson[14] attempts to prove that it is possible by means of radiograms to find the extent and position of ulcerative patches in cases of dysentery, and asserts that in the chronic case radiography gives a clear picture of areas where the ulcerated patches are situated. This paper is illustrated by a number of somewhat indifferent radiographs, and the technique is described. [It is a well-known fact that bismuth does not attach itself to the surface of ordinary ulcers of the stomach, and it is difficult to see why it should do so to ulcers of the colon. We have repeated these experiments with controls of healthy subjects, and failed to confirm the author's results.—C. T. H.]

Appendix.—Douglas and LeWald,[15] in reporting on the literature of fæcal concretions of the appendix as shown by radiography, point out the difficulties of a differential diagnosis; although in some cases the *x*-ray diagnosis has been successfully made, in others the shadows have been attributed to other causes. A radiograph of appendix concretions and ureter stones of similar size shows practically no difference in density to *x* rays. Usually a radiograph with an opaque catheter in position would clear up the diagnosis, but this fails in a certain number of cases. Vilvandré[16] should also be read in con-

nection with this subject. He reports four cases, and publishes some excellent radiographs. The shadows in each case show above the level of the iliac crest.

Pancoast,[17] in a preliminary report on the *x*-ray study of the effects of opium derivatives upon the gastro-intestinal tract, concludes that there is a decided lack of uniformity in the effects produced in different individuals, in connection with both stomach and bowel. Females appear to be more susceptible than males. In most cases there was more or less pyloric spasm, and delay in stomach emptying. In the small bowel, morphine causes decreased motility almost uniformly. The effect on the large bowel is very variable, and probably of little consequence. Oral administration produces the same effect as subcutaneous injection.

Lungs.—A useful paper on the radiography of the chest is published by Bythell,[18] containing much valuable information on technique, and many practical hints on diagnosis. A great point is made of the necessity and value of a thorough screen examination; the author lays down the law that with efficient apparatus, and skill, it should be easy to see (on the screen) even the faintest pathological mottling in the lungs, and to distinguish it readily from the normal shadows. The Coolidge tube is stated to be particularly well suited for these examinations. The observations on pulmonary tuberculosis are very good, and it is urged that in no other branch of radiography is it so necessary to combine together the *x*-ray and the clinical evidence, as in the diagnosis of early hilus tuberculosis in young children.

Fowler[19] considers that the value of radiography in the clinical diagnosis of **Lung Diseases in Children** is not yet sufficiently recognized. His two papers consist of a series of carefully noted cases in full detail, in which the clinical signs and radiographic findings are compared. Tuberculosis, pleural exudates, and pericardial effusion are the chief conditions discussed. Radiographs of a case of pericarditis, which show that an enormous effusion almost completely disappeared in ten days, are instructive.

Moore and Carman[20] report on seventy-one cases of the positive *x*-ray diagnosis of metastatic **Pulmonary Malignant Disease,** with typical illustrations. The radiological appearances are discussed and compared with those of other conditions. They conclude that the clinical picture in a majority of these cases is very indefinite, that the *x*-ray picture is very definite, and that in many instances the diagnosis can be established only by the radiograph. The value of this is that many patients suffering from malignant disease will be saved from useless and unwarranted surgery if routine examination of the thorax be made before operation.

Dunham[21] adds a note to his previously published original and valuable work on pulmonary tuberculosis, in which he epitomizes the work he has done during the past five years. In this he confirms his previous observations as to the anatomical structures underlying the

normal chest markings, and amplifies them. From a series of carefully carried out examinations he concludes that the spread of tuberculosis is, roughly speaking, along the bronchial branches, and until large areas are involved the lesion is limited to this distribution. Further, in his opinion, unless it be the physical condition of the patient, nothing has ever been of such prognostic value as the Röntgen findings.

Grier[22] describes a new method by means of which foreign bodies can be removed by bronchoscopy, and the bronchoscope directed by the fluoroscope both antero-posteriorily and laterally. This is done by means of a special table and two tubes, either of which can be immediately put into action. The point of the apparatus is that in attempting to remove a foreign body with the bronchoscope, an antero-posterior screen view will tell when the end of the instrument is on a level with the foreign body, but it will not tell whether it is anterior or posterior to it, and as it is not always possible to see the foreign body with the bronchoscope, it is of great importance to be able at once, and without moving the patient, to obtain a lateral *x*-ray view.

Hirsch[23] is emphatic on the necessity of carefully, persistently, and continually controlling the pneumothorax treatment of lung tuberculosis by radiography. The preliminary examination for the estimation of the amount of disease and for the selection of the site of the puncture is of importance, but not more so than those made to estimate the immediate effect, and later on to watch the progress of the case. All the conditions likely to be met with in these cases are fully dealt with, and the accompanying radiographs, which are good, illustrate the chief points of the paper.

Heart.—Wessler[24] deals with the *x*-ray evidence in the diagnosis of the obscurer forms of heart disease. Outline drawings of the screen shadows, as well as reproductions from plates, are used to demonstrate the slight differences in outline which the author considers as the indication of various pathological conditions. This paper is well put together, and is a valuable contribution to a somewhat difficult part of *x*-ray work. Amongst the illustrations is one showing the rare condition of pneumopericardium, due to the communication of the pericardium with a tuberculous pneumothorax. This is characterized by a curved linear shadow of the pericardium, which is raised off the heart by the underlying air.

Gall-stones.—Caldwell,[25] writing on the subject of the safe interpretation of radiographs of the gall-bladder region, protests against the making of positive diagnoses on the insufficient evidence of very indefinite shadows, and says that if only enough plates are taken it is possible to obtain these suspicious shadows in the gall-bladder region of any normal individual. He believes that the personal equation of the observer is more important in this field of *x*-ray work than in any other, and that this accounts for some reporting 85 per cent of results and others only 5 per cent. The paper is an

argument against the over-claims of certain radiologists; and the writer sums up the position admirably in saying that "it is very easy to make a Röntgen diagnosis of gall-stones. The difficult thing, at present, is to avoid making such a diagnosis occasionally when no stones are present."

Case[26] publishes some very interesting statistics as to gall-stones, based on a series of 300 operation cases in which *x*-ray examination was made, and the results confirmed or otherwise at operation. His results appear to justify the conclusion that it is possible to show gall-stones definitely in 50 per cent of positive cases. He considers that the time has arrived when, admitting that the negative evidence is of no value, *x*-ray examination should be made in every suspected case.

Urinary System.—Burns[27] suggests the use of thorium for pyelography instead of collargol. After pointing out that the latter is dirty, dangerous, and expensive, the second paper (there are two referred to) deals with the salts of thorium generally, and then describes the preparation of a safe solution of thorium for clinical work. The technique is fully entered into, and details are given of the pharmacological action of the solution and the results of experimental work on animals, with observations on its use in 125 cases. To make 100 c.c. of a 10 per cent solution, 10 grms. of thorium nitrate are dissolved in as little distilled water as possible. To this solution—kept hot on a water or steam bath—are added 30 c.c. of a 50 per cent solution of sodium citrate. Make the addition in small quantities, and shake thoroughly after each addition. The solution is made neutral to litmus by the addition of a normal solution of sodium hydroxide, and then made up to the required volume of 100 c.c. with distilled water. This solution is clear and watery, and so is readily eliminated: it does not stain, it is non-toxic, and is inexpensive.

Grainger,[28] in a preliminary report on the use of oxygen in pyelography and cystography, prefers it as less irritating than washed and filtered air. He illustrates this paper by radiographs showing stones, hypertrophy of the prostate, and malignant disease of the bladder walls. The full technique for injection both into the bladder and the renal pelvis is described.

Garrett[29] describes his routine in the examination of the urinary bladder. His paper deals mainly with the injection of opaque solutions into this organ as a means of diagnosis, and with calculi. He gives tables of the results of forty cases in which a chemical examination of the stone was made, and states that 30 per cent were pure uric acid. [This seems to be a very large proportion.—C. T. H.]

Meyer,[30] in a freely illustrated paper, deals very fully with the diagnosis of **Ureteral Calculi.** Whilst, generally speaking, he is of opinion that clinical examination and diagnosis should precede *x*-ray examination, in the case of suspected ureteral or renal stone (and then only from the point of view of the greater convenience and comfort of the patient) he is willing to reverse matters and have the *x*-ray examination made first. This paper is interesting, as it is written by

a surgeon thoroughly *au fait* with the possibilities and also with the limitations of radiography in this class of cases. Amongst his conclusions, with which no *x*-ray expert could find fault, are two of special interest. First, an *x*-ray examination should be stereoscopic, and a scratch on the wax-tipped ureteral stylet furnishes additional reliable proof of the presence of stone. Second, a negative *x*-ray result, plus missing a scratch on the stylet, may be accepted as proof of the absence of a ureteral stone.

Two papers indicate sources of error which may be met with in the *x*-ray diagnosis of calculi. Case[31] publishes a radiograph in which a wart on the back cast a dark oval shadow projected in such a way that it showed through the shadow of the transverse process of a lumbar vertebra. Ample experimental evidence proved that the shadow was really caused by the wart. Thurstan Holland,[32] discussing in general the reliability of radiography in demonstrating calculi, points out that the real difficulty is not to show stone shadows, but to make the differential diagnosis between these and other shadows. He insists upon the necessity for accuracy when writers are describing the nature of calculi, and that stones should not be described as uric acid calculi simply because they happen to contain an uncertain amount. The chief part of his paper is the detailed description of a case in which a rudimentary tooth in a dermoid cyst simulated a low ureteral stone both symptomatically and radiographically, and in which an error of diagnosis was made which, under the exceptional circumstances, appeared to be unavoidable (*see Plate II*).

Bones.—Neve[33] describes a case of leprosy in which the disease was so atypical that no exact diagnosis was made until the *x* ray showed the well-marked osseous lesions. The radiographs, of which only diagrams are published, show an entire disappearance of the terminal phalanges of most of the toes, plus partial decalcification of the other phalanges and thinning of the metatarsals. In the fingers, slight changes were perceptible in all the terminal phalanges of both hands.

Cotton,[34] writing on the limitations of the *x*-ray diagnosis of certain bone and joint diseases, points out that whilst radiography is very valuable in the diagnosis of most of these conditions, nevertheless in many of them, for example tuberculosis and acute infectious osteomyelitis, no radiographic changes may be seen in the early stages. Comparisons are made between tuberculous disease, syphilis, infectious osteomyelitis, and sarcoma. Further, the author concludes that there are different diseases in which the radiographic changes are similar, and therefore the differential diagnosis must be made from clinical data; and also that the *x* ray does not always give a true picture of the nature and extent of the pathological processes.

Hammond's[35] paper on some causes of error in the Röntgen diagnosis of bone and joint conditions should be referred to in conjunction with the above. The main thesis in this paper is that mistakes are often made in the interpretation of plates owing to a

Tooth in the cyst simulating a stone in the lower right ureter.

Contents of the cyst after removal.

lack of knowledge of the normal in its many variations, and because sufficient attention is not paid to the necessity for standardization in the taking of bone and joint plates. These mistakes should not occur if the radiologist possesses an adequate knowledge of the laws of the physics governing the *x* rays, and of Röntgen anatomy, including the many variations due to age and individuality.

Salmond[36] deals with tuberculosis of the bones and joints comprehensively in a well-illustrated paper, in which he urges strongly that in arriving at a diagnosis it is very necessary to consider the clinical examination, the history, and the other methods of examination, in conjunction with the radiographs. A negative radiographic opinion should never outweigh a careful positive clinical one. Not merely a radiographic paper, it is all the more valuable since he compares the naked-eye pathology of the disease as it affects the ends of bones and joints with the interpretation of the radiographic appearances.

Ledoux-Lebard, Chabaneix, and Dessane[37] describe a unique case of what is called a new form of **Generalized Osteitis** without symptoms. During the examination of a wounded soldier, it was noticed that radiographs of the knee showed innumerable small areas of dense bone throughout the ends of the femur and tibia. A complete examination showed that similar areas existed in all the bones except those of the skull and face, the vertebræ, and the ribs. The man was twenty-eight years of age. Curiously enough, Albers Schönberg[38] published almost at the same time a description of an exactly parallel case in a soldier, age twenty-two years. No cause of this condition could be traced in either case, but Schönberg believes that the condition is due to some disturbance in growth. One point was noted by the French authors : that the areas in the hand corresponded more or less to the distribution of occasional dense areas which are found now and then. Cases of this kind must be exceedingly rare, and these two are the only ones known to be published. The same French authors,[39] in a paper on the importance of variations of the skeleton when examining the wounded, drew attention to the varieties of shape and number in the bones of the carpus. The scaphoid is especially liable to variations in shape, and the triangular bone of the carpus which is found in the space above the tip of the ulnar styloid is the most common extra carpal bone.

Hicking[40] describes a new position for the *x*-ray examination of the hip-joint, which should be used to supplement the usual antero-posterior plate. The patient lies on the side, with the thigh flexed to form a right angle with the long axis of the body. The tube is placed in front of the patient, so that the central rays form an angle of 20 to 25 degrees passing through the great trochanter. Illustrative cases showed that bone changes could be plainly demonstrated in this position which were indefinite and non-diagnostic in the usual plates.

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X-RAY AND RADIUM THERAPY.

These two methods so overlap one another in theory and in practice that it appears best to consider them together.

Intimately connected with *x*-ray therapy is the protection of the *x*-ray worker, and incidentally of the *x*-ray patient. At a discussion of this subject, Russ[1] laid stress on the fact that the dangers are of two classes, namely, the obvious and the hidden, and among the latter are the blood changes following undue exposure ; also that while increase of knowledge has rendered *x*-ray dangers less formidable in one direction, in another, on account of the greater power of machines, the peril has been increased. There is plenty of material for thought in a study of the remarks made by many of the speakers, Morton for instance being very sceptical as to any effect from the secondary radiations, and not regarding *x*-ray effects as steadily and consistently cumulative, whilst he was inclined to regard the ionization of the air as being possibly dangerous. Finzi, experimenting with enclosed pastilles fixed on the front and on the back of the protective apron which took respectively two weeks and three months to colour to the B tint, suggests that a pastille dose which took three months to administer did not seem likely to do the operator much harm, even if continued for a long time. Connected with this subject is a note by Cantley and Harman[2] suggesting the possibility of optic neuritis being caused by *x* rays. A boy of eight and three-quarter years was treated for ringworm. A week later he was found to have marked swelling and striation of the optic disc. Throughout the time he was under observation the eyes presented the signs of a pure neuritis, and no direct cause of any kind could be discovered. In the absence of any clue to its origin, the *x*-ray treatment was suspected.

Standardization of Dosage.—The interim report of the committee[3] on this subject deals chiefly with existing practice and gives only a few suggestions, but is valuable as putting on record a large amount of information. It deals with (1) General principles and the methods of measuring the quality of *x* rays, the absorption of *x* rays, and the various penetrometers in use ; and (2) The various means of measuring

intensity, such as ionization, photographic methods, chemical, etc., concluding with a series of experiments carried out to make a comparison of the *x*-ray bulbs in actual use at various hospitals. In connection with this subject, Donnithorne[4] has suggested a "new modification of the ionization method of measuring *x* rays." He deals with the subject especially with reference to the difficulties, the chief of which has been always in the smallness of the currents measured. He claims that he has been able to produce a simple instrument for the measurement of *x*-radiation in medical work in which the improvements are an ionization chamber that will pass much larger currents than usual, and an indicating instrument strong, reliable, sensitive, and relatively cheap.

Knox and Caulfield[5] have invented an ingenious instrument which they call "a new therapeutic *x*-ray localizer," which can also be adapted for applying radium when used from the surface. The principle of the apparatus is that of a rotating tube-stand, by means of which a maximum effect can be produced in the treatment of deep-seated disease by directing the central *x*-ray stream with mathematical accuracy on to a given spot. The authors do not say that the idea of the rotating tube-stand is entirely new, but they claim to have placed in the hands of radio-therapeutists an instrument of precision which should greatly aid in the application of *x* rays.

Pulmonary Tuberculosis.—Panoupolos[6] suggests a new method for the treatment of this condition. The procedure consists in the destruction of Koch's bacillus by ozone formed in the lungs under the agency of the inspiration of pure oxygen and the simultaneous action of hard *x* rays. Before radiation, the patient is made to breathe pure oxygen by means of an apparatus which prevents the entry of air into the lungs, and after five minutes' inspiration the patient is exposed to the action of hard *x* rays.

In view of the fact that the *x*-ray treatment for **Uterine Fibroids** has been boomed to such an extent during the past few years, it is well to call the attention of those using, or advocating, this method of treatment to a paper by Bland-Sutton[7] on 200 cases of hysterectomy which all recovered. The remarks on the difficulty of accurate diagnosis are such as to impress very forcibly upon the mind that *x*-ray treatment is by no means the one of choice to be advocated for every case diagnosed as fibroid. When the distinguished author says that in diagnosis there are two things which are disquieting, namely (1) to distinguish between solid ovarian tumours and large submucous fibroids, and (2) to distinguish between tubal swellings and uterine fibroids, it seems obvious that the *x*-ray treatment for this condition should be reserved for specially selected cases in which for some reason operation is contra-indicated and in which the diagnosis can be made with accuracy.

Case[8] contributes a very valuable paper on the Röntgen treatment of **Uterine Carcinoma** in which the whole question is dealt with in a very fair and level-headed manner. The chief point is the

immense difference between the *x*-ray treatment of years ago and that made possible at the present time by the Coolidge tube. Enormous currents can be passed through the later types of this tube for long periods of time. It therefore becomes obvious that far greater skill and judgment are required for the successful and safe administration of deep Röntgen therapy. Case makes an important statement in saying that insufficient irradiation is likely to produce more active growth through irritation, and that malignant tumours belong to a class of tumours in which treatment should be given in massive doses, and any treatment with radio-active substances which does not produce improvement is likely to cause considerable injury. The opinions and results of many workers are given, and the author, in summing up the position as regards *x* rays and radium, shows that with both, the biological effects, as well as the principles of application, are identical, and that it has never yet been demonstrated that the effect of gamma rays on carcinomatous tissue is more intense than that of hard Röntgen rays. The degree of success, and the effect, entirely depend upon the quantity of rays absorbed by the pathological tissue. Several cases are referred to in which operation was performed after irradiation, with a description of the histological examinations; the dangers and occasional untoward effects of massive *x*-ray doses—such as fever, nausea, acidosis, bladder and rectal irritation—are described; and in summarizing the results the author says that, "although he is not able from his own experience, or from a perusal of the literature, to assume an optimistic attitude towards the Röntgen treatment of uterine carcinoma so far as a cure is to be expected, he would again urge an appreciation of the very satisfactory palliative results the *x*-ray method affords."

In fifty consecutive cases of menorrhagia, dysmenorrhœa, and uterine myoma, Lange[9] obtained satisfactory results by achieving a permanent artificial menopause, at any age of the patient. He finds it a safe working rule that if one period is missed, treatment can be stopped. The radiation required varies from 800 × to 100 ×, the amount lessening in inverse ratio to the age of the patient. The interest in the series of cases is that even in young girls, seventeen or eighteen years of age, apparently a permanent menopause was brought about.

Corscaden[10] considers that *x* rays destroy the follicle apparatus of the ovary and cure all cases of bleeding from the uterus which are without any gross pathological lesion. In **Myomata**, only those cases should be treated by irradiation where there is no immediate or remote menace to the patient apart from the hæmorrhage, and who are thirty-seven years of age or over. In hæmorrhage from malignant disease, *x* rays are contra-indicated.

Hernaman-Johnson,[11] in reporting a case of extensive malignant ulceration treated by *x* rays with temporary complete success, uses it as a basis for comparing the effects of *x* rays and radium, and deprecates the tendency to belaud the use of radium in cancer as though

its action was something apart from, and transcending that of, all other agents. He takes the view that the gamma ray of radium is but one end of a therapeutic series of which the ultra-violet ray is the beginning; and that light, *x* rays, and gamma rays differ, from the physicist's point of view, only in wave length. Further, there are some clinical grounds for believing that different tumours require different wave lengths for their successful treatment.

Johnson[12] advocates the utmost boldness in dealing with recurrent malignancy, and is a great advocate of prophylactic treatment after operations. The sole question to his mind is, How much intensive radiation is required in any particular case to destroy utterly the recurrence present? He pays no attention whatever to the production of dermatitis. He describes a heavily protected box which he has devised for holding the tube close to the area under treatment, and which protects the rest of the patient.

Kempster[13] advocates the introduction of 'progressive filtration' in treating **Fungating Epitheliomata.** Details of two cases are given. In the treatment of a number of cases, he has noticed that those gave the best results in which he gradually introduced filters of progressive thickness. Commencing with unfiltered doses—to get the maximum effect on the more superficial parts—he then uses a filter of 1 mm. of aluminium, later one of $1\frac{1}{2}$ mm. plus layers of lint, and finally one of 2 mm. thick. Several measured doses are given at intervals with each filter before going on to the next series.

The great value of Pfahler and Zulick's[14] paper on **Exophthalmic Goitre** is in the extensive bibliography, amounting to seventy-six references, of which the more important are referred to in detail. The authors' own conclusions are also of interest: they consider it justifiable to try *x*-ray treatment temporarily in all cases; the thymus should always be included. Whilst symptomatically improvement is usual, the goitre and the exophthalmos are the last to show it, and in many cases show no change. A warning is given not to prolong the treatment over too great a period lest hypothyroidism is produced. White and Hernaman-Johnson[15] relate three cases showing the connection between the irritable heart of soldiers and Graves's disease, and these contrasted are very significant and suggestive. Treated with *x* rays a beneficial result was brought about in each case, and the authors are of opinion that in all such cases of irritable heart, if there is the slightest suspicion of hyperthyroidism, the *x* rays should be added to the other suitable measures of treatment.

Lanzarini[16] records three cases of the successful treatment of **Rickets,** with anæmia and large spleen. After a month of *x* rays, hæmoglobin increased 5 to 10 per cent. In two cases body weight increased. Diminution in the spleen took place a fortnight after treatment began, and was progressive, and in one case the normal size was reached.

Jona[17] relates a case of **Hæmolytic Splenomegalic Jaundice** cured by *x* rays. The spleen was enormous. Full details of frequent blood examinations showed continuous improvement, and the spleen steadily

diminished in size. X-ray therapy produced slowly the same results as splenectomy would have done. This seems to be the first case reported as cured by æ-ray treatment.

Radium.—Stevenson[18] has compiled a *radium emanation table* for clinical work to enable the operator to read off at a glance the hourly decrease of the emanation after reaching its maximum, four hours after collection. In recording the dosage, he adheres to the millicurie and radium element standard as the most uniform, logical, and generally convenient method of measurement. He explains this table in detail, and asserts that for clinical work it has great advantages, enabling the operator immediately to estimate and record, at any time after commencing the treatment, the average quantity of emanation employed, and to ascertain at once the amount of ionization effected by a certain length of exposure. A further paper by the same author[19] gives additional information as regards the recording of radium dosage, and also details the particulars of eleven cases treated with one set of radium emanation capillaries in needles. This technique is of value, inasmuch as it indicates what can be done with comparatively small amounts of radium, and it also shows that by carefully planning the treatment, and by arrangement of the cases, a lot can be done with one set of capillaries. Cases in which there is evidence that short exposure with a large amount of radium should be given are taken first, and those in which a long exposure with a small amount is needed (such as rodent ulcer) are taken last.

The first report of the Manchester and District Radium Institute[20] for 1915 is marked by great moderation. It contains a warning that whilst the chief work of the department has been that of the treatment of cancer, the general public should not take an exaggerated view of what radium can accomplish in this direction; and that as only inoperable cases are treated, cures must of necessity be few and far between. The Manchester clinic has advanced Stevenson's method of burying emanation needles in growths, and Dr. Burrows (the director) has a modified needle in which the solid-pointed end and the eyeleted end can be screwed on and off. The report states that the treatment of **Carcinoma of the Cervix Uteri** by radium has, on the whole, given good results. The value of this statement entirely depends upon what is understood by the phrase 'good results.' The temporary amelioration of symptoms brought about by radium treatment in such cases can, in the opinion of many surgeons, be achieved equally well by scraping and the use of the cautery. In all, 519 cases were treated during the year.

A paper by Ordway[21] on *occupational injuries due to radium*, with a report of cases, furnishes interesting reading. After a reference to various reports on the effects on the fingers of those working with radium, the paper gives details of nine cases in which the fingers of physicians, nurses, medical students, and a physicist working in a radium department, all suffered. A number of photographs illustrating

the paper demonstrate very well these skin changes. Summarizing, the author says it is evident that marked changes occur on the fingers of those engaged in routine work with radio-active substances. These local objective changes consist chiefly of flattening of the characteristic ridges, thickening and scaling of the superficial layers of the skin, and even atrophy and intractable ulceration. These lesions are usually slight compared with the marked subjective symptoms, such as par-æsthesia, anæsthesia of various degrees, tenderness, throbbing, and even pain. The persistence of such effects is noteworthy. Various general systemic symptoms and also blood changes may be produced by exposure to radio-active substances. To avoid such local and general disturbances, special protective and preventive measures have been devised, and those engaged in routine handling of radio-active substances are particularly cautioned.

Howard Kelly[22] is an enthusiast as regards radium therapy, and has treated over 2000 cases. He considers it a most potent agent to enlarge a sphere of control over the worst of all diseases. It will do many things we have never been able to do before, although it is by no means a specific except in lymphosarcoma. This is the concluding sentence in a freely illustrated paper, in which the chief aim is to show what radium will do. In 20 cases of lymphosarcoma, all advanced, entire relief resulted in 65 per cent, and surgery is stated to be no longer justifiable in such cases. In fibroids and bleeding uteri, radium introduced into the uterus on the end of a uterine sound gives astonishingly good results. In cancer of the cervix, with an experience of 213 cases in six years, 53 are stated to have been clinically cured, whilst the relief given in those not cured has been so great that even if radium never cured a single case, it would still be one of the greatest of therapeutic agents. Statements of this kind, backed by the authority of this author, must be given due consideration.

Miller,[23] writing on the effects of radium in **Carcinoma of the Cervix Uteri**, states most emphatically that radium is a great boon to the patients. The paper is the result of the author's own experience in 26 cases of inoperable or recurrent cancer of this region, and the results are contrasted favourably with those of ordinary surgery. Discussing the dosage, he concludes that not less than 50 mgrms. of the radium element should be employed, lest the growth be stimulated. He uses 75 to 85 mgrms., and endeavours to give 3000 to 5000 mgrm.-hours within a week or ten days. One month later, further applications are made. He has no doubt that cancer of the cervix can be entirely eradicated by radium, but of course outlying cancer areas, glandular metastases, and so on, cannot be reached, and these are what control after-results.

Abbe,[24] in a paper illustrated by a variety of cases, demonstrates that radium has other uses than that of the treatment of malignant disease, and that in many non-malignant conditions it is of the greatest use. For instance, in vernal catarrh, a disease considered intractable by oculists, prompt and permanent cure can be brought about. It is

shown that warts, vocal cord papillomas, and keloids, amongst other conditions, react most favourably. Illustrations of a remarkable keloid following burns of the face, before and after treatment, are very convincing. Further, Abbe considers the most extraordinary of all the effects known to him is the cure of **Uterine Fibroids,** These, after the introduction of a tube of radium into the uterine cavity for two or three hours on two or three occasions, progressively shrink until they disappear, whilst the excessive hæmorrhage stops. It is added that the cure is a permanent one, and cases are quoted which have been under observation since 1905.

In the treatment of **Synovial Lesions of the Skin,** Sutton[25] tried radium, adopting the fractional dose method, using a quarter-strength applicator, unscreened, for half to one hour on eight successive days. An accurate account of the condition (with photographs of his case) is given. Five months later the swelling had disappeared, and there was no recurrence. He was led to try radium from the reports of two similar cases cured by *x* rays.

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ELECTROTHERAPEUTICS.

Ultra-violet Radiation.—Harmer and Cumberbatch,[1] discussing what is known as the Simpson light, a light which is produced by electrodes made from the ores of certain metals, the chief one being wolfram (a tungstate of iron and manganese), point out that the light is made up of rays of two kinds, visible and invisible. The latter are heat and ultra-violet rays, and they play the chief part in the therapeutic action of the light. The importance of this lamp appears to lie in the fact that it is very rich in ultra-violet rays, and that it also produces rays of shorter wave length ; and whilst the therapeutic action is mainly the result of the first, some action, peculiar to the light, may be attributed to the second. The paper then goes on to describe the lamp, which is quite simple, and the method of using it, and gives the results in various cases submitted to treatment. It should be remembered that the eyes of the patient and operator must be protected, and that intense erythema of the skin may follow on therapeutic doses. The authors are of opinion that the light will prove of value in superficial ulcerations. Further information on the nature of this light is

to be found in a paper by Sidney Russ,[2] who has made various experiments with it, and with other forms of the ultra-violet light, from the point of view of the spectrum. Two important observations made by him which bear on the therapeutic possibilities are: (1) That two spectra obtained, the one from electrodes of pure tungsten, and the other from the Simpson arc, were apparently identical; and (2) That the skin is very absorbent of ultra-violet radiation however obtained. In wave lengths of 2100 to 3000 A.U., less than one part in a thousand penetrates to a depth of half a millimetre; whilst in wave lengths 3000 to 3800 A.U., it is doubtful whether as much as 1 per cent penetrates as deep as 1 mm. With long exposures, however, a small percentage of the radiation will penetrate 1½ mm. of human skin.

Menzies[3] has treated forty cases with the Simpson light, including **Lupus, Graves's Disease,** and the **Septic Wounds** of soldiers. The doses were given usually twice a week for two and a half to three minutes, and the relief of pain, increase of movements, relief of swelling and inflammatory induration, absorption of scar tissues, and diminution in discharge from wounds, were the chief effects noted. He is favourably impressed by the results. Harmer[4] reports cases of **Lupus** and of **Rodent Ulcer** as considerably improved by this treatment. He also, after forty applications, brought about great improvement in a chronic and intractable case of **Asthma.**

Ffrench[5] discusses his results in forty cases of **Venereal Lesions,** and incidentally describes the apparatus and the technique employed. In a number of bad, selected cases, in which antisyphilitic treatment for months had failed to bring about improvement, it was noted, when these rays were used, that improvement immediately began. The scar tissue after healing of the ulcers had a much better appearance than that of the ordinary healed syphilitic ulcer.

Hernaman-Johnson,[6] discussing some of these results, points out that the light has been boomed in the public press as a 'new kind of *x* ray,' and he is emphatic that it is in no way even related to *x* rays. He is also strongly of opinion that 'Simpson light' is a bad term to use, and that the apparatus for the production should be termed the 'Simpson arc' or the 'Simpson tungsten arc,' the light being simply the ultra-violet rays. [In view of what is now known as to the nature of the rays, and in view of the advertisement in the public press and the very extravagant claims made as to the results obtained, we are in entire agreement as to this. The real point is that these rays are ultra-violet rays produced by a Simpson tungsten arc, and that this method of their production is the most efficient of those at present known.—C. T. H.]

Morphy and Mullard[7] describe a pointolite lamp made of quartz as the very first really successful enclosed arc lamp, and its chief feature in addition is the ingenious method by which the initial striking, the hitherto chief stumbling-block in the way of a totally enclosed arc, has been overcome. It is introduced as a convenient source of ultra-violet rays, and is a tungsten arc in nitrogen vapour

It does not give the shorter wave lengths of the Simpson arc. It should have a considerable value for photographic purposes.

Electricity in War.—The electrical treatment of **Trench-foot** and **Frostbite** is dealt with in an able article by Turrell,[8] who points out that for the relief of the intense and agonizing pain, diathermy is invaluable, the results being often immediate and lasting. The electrodes are to be placed on either side of the part to be treated, and the importance of this method is that by its means any required heat in any structure can be obtained. Cases are quoted in full, showing striking results. The author also discusses the static breeze current in similar conditions, this being of use when there is considerable swelling, numbness, ecchymosis, and ulceration. In the acute stages its use is not indicated. In pointing out that fluid in a knee-joint can frequently be removed by absorption by twenty minutes' treatment, or the acute pain of lumbago in the same time, it is insisted upon that such results can only be obtained by the use of powerful machines. The paper concludes with an appeal for adequate electrical equipment in hospitals, and for direct control by qualified medical men specially trained. It is useless, and brings discredit on such treatment, to have it carried out by poor instruments controlled by unqualified and untrained men.

Burke[9] calls attention, by means of illustrative cases, to the great improvement which can be brought about in the **Scars of Wounds** by suitable electrical treatment. He suggests twenty minutes' heating by electric-light bath, followed by ionization with chlorine for half an hour, three times a week, combined with massage and movements. He points out that by perseverance certain cases can be returned either to the firing line or to a useful civilian life—cases which are too often discharged from the army untreated, and with consequently permanent disabilities.

Nerve Lesions.—Longridge[10] makes some interesting observations on the use of the *galvanometer* as an aid to the diagnosis of nerve lesions, using a very sensitive astatic instrument of the Kelvin type, which has a resistance of 99,000 ohms. He maintains that he obtained definite proof of the theory that the brain is the seat of generation of an electro-motive force which is carried to the tissues by means of the nerves. He describes the technique adopted, and gives an account of two cases tested before and after operation, and is of opinion that he established the fact that the nerves obviously conducted electricity, or a trophic influence which is at present indistinguishable from it.

Hernaman-Johnson[11] communicates a detailed paper on the use of *condensers* in the diagnosis, prognosis, and treatment of nerve lesions. He gives a very full account of the subject, and shows the reasons why the ordinary faradic coil is doomed as an instrument for diagnosis. He describes an instrument he has devised, which is a modification of the Lewis Jones condenser, by means of which any number of impulses can be produced between 1 and 20 per second, or more; this is an

accurate and scientifically standardized substitute for the faradic coil, and also in the great majority of cases for the galvanic current. It means that as regards nomenclature the terms 'faradic response' and 'reaction of degeneration' should be dropped, and their places taken by a statement as to the smallest condenser which will produce appreciable contraction under given conditions. The importance of this is that definite figures can be put down and compared with past and future tests of the responses, which are accurate and thus of value in deciding upon diagnosis and prognosis.

The same author[12] draws attention to the necessity for prolonged treatment in cases of **Infantile Paralysis,** and illustrates his remarks by photographs and radiographs of a case which was under observation and treatment for a period of over five years, and in which the ultimate result was very good. The principles insisted upon are three : (1) The necessity of relaxing by splints over-stretched muscles ; (2) When such a muscle responds moderately well to faradism, its recovery will be greatly hastened by daily rhythmical electrical stimulation ; (3) Such exercise must never be carried to the point of muscle fatigue.

A paper by Steel[13] on the influence of electricity on metabolism describes in full a large number of experiments carried out with great attention to detail. It is a very valuable scientific addition to the knowledge of the subject, and should be studied by all interested in electrotherapeutics. The main conclusions drawn by the author will indicate its scope. Shortly they are as follows : Relatively strong electric currents of various types always brought about a stimulation of metabolic processes. The volume of urine was increased by those currents which do not have a pronounced thermic effect, and vice versa. All currents caused an increase in the quantity of solids in the urine, and also of the contents of the nitrogen and sulphur. The most striking and consistent effects on the partition of the urinary nitrogen were the increase in urea and creatinin elimination. The increased elimination of urea may be in large part attributed to quickened cellular metabolism, and the increased elimination of creatinin to muscular contractions. It. is especially noteworthy that recovery from the effects of electrical treatment was always prompt and apparently complete. Usually, after two days, no effects could be detected

Ionization.—Budden[14] discussing the treatment of **Rheumatic, Neuralgic**, and **Allied Pains** by ionization with sodium salicylate, which in his hands has given extraordinary success, says that the whole secret lies entirely in the method of administration, and that this may be summed up in the single phrase—attention to detail. He then gives a practical account of his technique which should be of great use to those interested in this subject. The source of the electric current to be employed, the switchboard, the electrodes, the preparation of the medicament, the arrangement of the patient, the duration of the treatment, and the strength of the

current, are all entered into with exact and careful detail, the paper concluding with a short note indicating the cases suitable for ionic medication. This paper is practical, well arranged, and full of valuable suggestions. General practitioners using this form of treatment will find it of especial value.

Electrolysis.—Bathurst[15] contributes a very practical note on the **Removal of Hairs** by electrolysis. He deprecates very strongly the use of various depilatories, and considers electrolysis the only safe and efficient way of dealing with this condition. He describes the apparatus and its exact method of use in a manner which is easy to follow. He concludes with the observation that although some alteration of the general texture of the skin is unavoidable, obvious scarring is prima facie evidence of bad workmanship.

References.—[1]*Lancet*, 1916, i, 76 ; [2]*Brit. Med. Jour.* 1916, i, 124 ; [3]*Lancet*, 1916, i, 508 ; [4]*Roy. Soc. Med.*, Laryng. Sect. 1915, Dec., 23 ; [5]*Lancet*, 1916, i, 240 ; [6]*Ibid.* 586 ; [7]*Jour. Röntgen Soc.* 1916, July, 70 ; [8]*Pract.* 1916, i, 52 ; [9]*Arch. Rad. and Elect.* 1916, May, 419 ; [10]*Brit. Med. Jour.* 1916, i, 717 ; [11]*Lancet*, 1916, i, 396 ; [12]*Ibid.* ii, 185 ; [13]*Med. Rec.* 1916, i, 459 ; [14]*Pract.* 1916, i, 422 ; [15]*Ibid.* 1915, ii, 654.

Part II.—The Dictionary of Treatment.

A REVIEW OF MEDICAL AND SURGICAL PROGRESS FOR 1916, BY MANY CONTRIBUTORS.

ABDOMEN, PENETRATING WOUNDS OF.

E. Wyllys Andrews, M.D., F.A.C.S. (Chicago).

A large amount of discussion in the journals of all the countries at war has gone on during the past year on the subject of penetrating wounds of the abdomen. By combining all the statistics from the commencement of the war, Quénu obtained a total of 217 cases of abdominal wounds not operated upon, with 171 deaths, a mortality of 78 per cent. Later, he combined the results of abstention at the hands of a number of surgeons, and of 53 cases not operated upon there were 29 deaths, a mortality of 54 per cent. Adding later figures he obtains 375 cases with 305 deaths. Other writers report a mortality of 100 per cent with cases not operated upon. He recognizes that in many cases it is impossible to determine whether the bullet has penetrated the abdomen. Nevertheless, he believes in radical interference as a routine procedure. His conclusions are: (1) Those cured without operation had, in nearly half the cases, non-penetrating wounds; (2) Most of those with penetrating wounds showed an omental hernia; (3) Of penetrating wounds of the viscera there are only 6 recoveries, 1 doubtful wound of the stomach, 3 of the liver, and 2 of the colon; (4) Wounds of the solid viscera and large intestine may, for special reasons, be more favourable, the trajectory of the projectile being homolateral and posterior. (5) The net result of this study favours much the treatment by operation.

Fraser and Bates discuss, in the *British Medical Journal*, the outcome of abdominal wounds treated with and without operation. They remind us that thousands of such cases have been reported during the war with a very high mortality, and think that this ought to be reduced. They emphasize particularly the importance of a complete scrutiny of all abdominal organs during operation so as not to overlook bleeding or perforation at some other point. (*Plate III*), They agree with Cuthbert Wallace in stating that men shot through the abdomen die mainly of three causes—hæmorrhage, peritonitis, or post-operative obstruction. They conclude that immediate laparotomy, most of all if hæmorrhage is suspected after the lapse of an hour or two, is indicated in most cases. In spite of the bitter

disappointment and high mortality, they conclude that this operative management will give the greatest number of recoveries.

Meyer and Taylor report, in the *Lancet*, 50 consecutive laparotomies for abdominal wounds performed at the 17th Casualty Clearing Station in Flanders. The time between injury and operation was usually under twelve hours. The incision was planned to give the easiest access to the supposed point of injury. The peritoneum was rapidly cleansed of blood and intestinal contents. Small perforations were rapidly closed by suture. Bleeding wounds of the liver and spleen were sutured or packed with gauze, which was removed on the fourth day. Drainage of the peritoneal cavity was kept up for twenty-four to forty-eight hours. Of this series of 50 cases, 17 died and 33 were evacuated to the base hospitals. Of non-operated cases there were 41, of whom 17 died.

Cuthbert Wallace reports on the early operative treatment of gunshot wounds of the abdomen. The percentage of abdominal wounds in four stations was from 0·62 to 1·88 in different stations in France. It is largest with the field ambulances and smallest in the clearing stations. In nine field ambulances there were 1098 abdominal wounds, with 333 deaths. In six clearing tations there were 133, with 74 deaths. Wallace also analyzes these cases with reference to their location. He states that it is frequently difficult to make sure that a wound is penetrating, especially when there is only one wound. Bomb wounds require special notice. The fragments are small and have extreme velocity. Sometimes a number of minute wounds in the same abdomen are found all to have perforated. The causes of death have been shock, hæmorrhage, peritonitis, and retroperitoneal infection. The nature of the visceral lesion varies much with the projectile and its direction. Fragments of shell cause large, irregular openings, with free escape of contents. With small bullet wounds the punctures may sometimes be almost self-closing. As to operative or non-operative treatment, the old idea that a larger proportion recovered is fast being abandoned. The results of early operation can be shown statistically to give the higher percentage of recovery.

Boit, reporting on gunshot wounds of the stomach and intestine in the German service, finds that the mortality was 84 per cent in bowel perforation and only 15 per cent with the stomach. The prognosis is better in the cardiac region or lesser curvature than near the pylorus. One of Boit's suggestions is that separate hospitals should be established for abdominal injuries.

Schwartz, quoted by Quénu, reports 33 laparotomies for gunshot wounds in the French service. Of these, 9 were his personal cases, 8 of whom had perforation of the small intestine, and 1 had no intestinal lesion. There were 5 recoveries in this series. The remainder of the cases were by Bouvier and Caudrelier, showing 18 deaths and 15 recoveries. Quénu also reports 58 cases of Sencert with only 13 recoveries, a mortality of 77 per cent.

Rouvillois reports a series of 247 abdominal wounds classified as

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ordinary appendicular abscess.

The patient presented a single wound in the epigastrium. On opening the abdomen, the peritoneum was found full of fluid fæcal contents, and was seen to be perforated by a gangrenous appendix. The appendix, which lay loose in the pelvis, was removed, and the perforated cæcum was sewn up. The cavity of the abscess was then irrigated and packed round with gauze, and the wound partially sutured. The patient was very collapsed at the end of the operation, but rallied well after the injection of saline solution and has been progressing favourably ever since. The gauze packing was removed on the seventh day, and the wound is now almost healed.

PLATE IV.

GUNSHOT WOUNDS OF THE KIDNEY

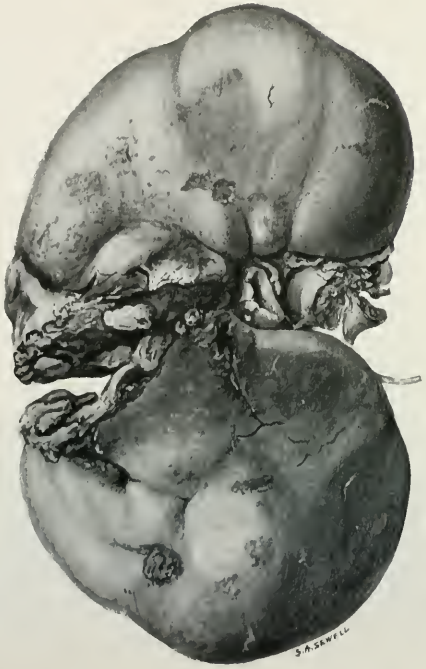

Fig. A.—Bullet wound of the right kidney. This has practically bisected the organ, extending into the renal pelvis. Hæmaturia was a marked feature of the symptoms.

Fig. B.—Comminution of the upper half of the kidney. The organ has been reconstructed by assembling a number of fragments enclosed in blood-clot.

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extraperitoneal, peritoneal, or thoraco-abdominal. Extraperitoneal wounds present no dangers or difficult problems. In 74 laparotomies in this series, 38 showed severe hæmorrhage, but in all but two this bleeding was from small vessels. Of 40 cases operated upon immediately, 23 were of the small intestine, 8 of the large intestine, and 9 of the liver.

Cuthbert Wallace has furnished a very complete report in the *Journal of the Royal Army Medical Corps*. This shows that abdominal wounds were a total of 1·92 per cent of all injuries in nine field ambulances. These gave a mortality of 30·33 per cent. The problem of determining peritoneal involvement is a very difficult one at an early stage. The possibility of the escape of the viscera is also discussed by this writer. In a few cases it has been found that bullets have traversed the abdomen without wounding the intestines. The results gained by early operation show a reduction in the mortality. In six casualty clearing stations from July 1 to September 25 the mortality was 48·77. Wallace concludes that no one who has had opportunity during this war of operating upon such cases has any doubt as to the success gained by the method.

Mayo Robson, while serving in the Dardanelles, saw a large number of gunshot wounds of the abdomen. At first, influenced by the South African war experiences favouring the opium and starvation treatment, they resorted to conservatism. Robson soon came to the conclusion that more could be done for these patients, since a very large proportion ended badly. It is true that after peritonitis had set in, no operation, or simple drainage with the Fowler position, gave the best results: but when seen early, operative interference gives the highest percentage of recoveries.

Stevenson, Shaw, and Mackenzie report, in the *Lancet*, 50 laparotomies for gunshot wounds of the abdomen. Operation was done at the earliest possible moment. In some instances the abdomen was distended with blood, and early interference prevented death from hæmorrhage. The mid-line incision proved most generally useful. The visceral wounds were closed with fine sutures, or in extensive lacerations sections of the intestine were resected. In this series the recoveries were 34 per cent, but this only included two cases in which the wound was non-penetrating. In the 17 cases which recovered, the lesions of the viscera were in the following locations: Small intestine alone, 4; small and large intestine, 3; large intestine alone, 1; stomach and liver, 2; liver, 3; hæmorrhage without perforation of intestine, 3; Wound of omentum, 1.

From the German service, Kraske reports a series of gunshot injuries of the abdomen treated by operation. In only one case was he able to operate within six hours. Five came in a dying condition, and of the remaining 73, 19 had injuries of the abdominal wall only. There were 39 cases of penetrating injuries of the viscera, of which 19 died and 20 recovered.

L. Guerry, of South Carolina, reports a series of 27 cases of gunshot

wounds of the abdomen in civil practice, with 3 deaths. He shows that in the Crimean War the mortality was 92·5 per cent and in the American Civil War 87·2 per cent, whereas in a later series of cases quoted by Moynihan the mortality was stated as 73·95 per cent. His own lower mortality corresponds with the best results in civil practice, due largely to the smaller bullets and the more prompt interference.

Sir George H. Makins, in the *British Journal of Surgery*, reports a large series of *gunshot wounds of the solid abdominal viscera* in France. These include penetrating wounds of the liver, both by shell fragments and bullets, with an interesting review of their complications, such as jaundice, biliary fistula, etc. Of these cases, 60 per cent died from septic infection and 40 per cent from secondary hæmorrhage. Injuries of the spleen are also common, as are those of the kidneys and of the pancreas. Sometimes both hollow and solid viscera are found to have been penetrated. A large number of these cases, with excellent photographs, are included in this paper (*Plate IV*). An interesting complication in the kidney injuries is the perirenal hæmatoma, which occurs in two locations, anterior and posterior. The writer emphasizes the importance of determining the question of kidney injury in all abdominal wounds. The surgeon should be satisfied that the bladder and ureters contain no blood. In his series, eight nephrectomies were performed for bleeding wounded kidneys, with only two deaths.

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ABDOMEN, SURGERY OF.

E. Wyllys Andrews, M.D., F.A.C.S. (Chicago).

A. J. Nyulasy advises a more general use of **Bowel Drainage** in *septic peritonitis*, concluding that the toxæmia in these cases is due to intestinal absorption and severe dilatation. He concludes that the rational treatment would be the removal of the unabsorbed toxin and prevention of its further production. This is best obtained by free drainage of the bowel content. In the Perth Hospital, Western Australia, he has treated six cases of septic peritonitis by intestinal drainage, all of which recovered. This he claims could not have been possible with any other treatment. His attitude is made clear by the following summary: (1) With the removal of septic foci, cleansing the abdomen, and the use of the Fowler position, patients may continue to grow worse from paralytic ileus, whereupon intestinal drainage should be established by an artificial anus; (2) At the primary operation, if drainage of the septic focus has not been established, intestinal drainage under local anæsthesia may do good as a substitute: (3) If when first seen there are evidences of severe paralytic ileus, intestinal drainage should form part of the primary operation.

Rovsing's operation for *gastrocoloptosis* is described by G. Torrance,

who reports seventeen cases in the past two years. The most prominent symptoms were constipation, epigastric pain, nausea, vomiting, headache, nervousness, and loss of weight. The operation has been modified somewhat, and includes an effort to elevate the liver. The usual three rows of stitches are passed on the anterior surface of the stomach, and the colon is stitched to the lower part of the stomach wall by linen sutures. Improvement was marked in nearly every instance, the time being too short as yet for conclusive opinion.

The *transverse abdominal incision* is praised by Willy Meyer, of New York. He came to employ it first as the result of experience in resecting the cardiac end of the stomach, which is usually very inaccessible. The typical transverse incision close to the rib borders, which does not destroy the innervation of the rectus muscle, gives good access to the gall-tract region and duodenal area. It also gives better approach than usual to the cardiac end of the stomach and the area about the spleen.

D. G. Wilcox, discussing *pelvic adhesions*, seeks to demonstrate how nature deals with infected viscera in the pelvis by commandeering the adjacent structures and cementing them into a wall of adhesions. In the pelvis these may be due to foci around the appendix, and in children such adhesions may later compromise the functions of the tube and ovary, and sometimes cause sterility. The pelvic organs, being bound down or twisted by bands of exudate, cannot properly functionate. Patients become invalided also from recurrent attacks of localized peritonitis due to escape of pus or serum from a diseased tube. Unmistakable evidences of pelvic adhesions are: (1) A dense inelastic pelvic floor, there being no free mobility of the uterus; (2) Unusual pelvic sensitiveness; (3) The presence of a tumour or mass behind or either side of the uterus; (4) Malposition of the uterus from adhesions.

Maylard, reporting from the Victoria Infirmary of Glasgow, calls attention to the danger of iodine solution for sterilizing the skin in abdominal operations. In full strength it is prone to irritate the skin, but, worse than this, some of it may enter the peritoneal cavities by contact with the exposed viscera. Maylard finds other operators, notably Propping and Bertelsmann, have had the same experience. He also met with six cases of ileus attributable to iodine irritation. The possible evils of this antiseptic in abdominal work were also confirmed by Walker and Ferguson, writing in the *Annals of Surgery*. In animal experiments they found that slight contact with iodine-soaked pledgets caused very dense post-operative adhesions. He has therefore abandoned it preliminary to laparotomies.

Green, New York, has devised a stitch to assist the closure of the posterior sheath of the rectus in abdominal section. Finding that an ordinary running stitch had a tendency to pull out or tear the fascia, he employed one similar to that used in suturing tendons—a back-and-forth mattress inclosing in its loop a segment of the fascial layer.

John D. Malcolm reported a second interesting case of *pneumoperitoneum*, probably induced by the *Bacillus aerogenes capsulatus*, with release of gas and recovery. The woman, age 38, had a tender mass each side of the uterus. Upon opening the abdomen, all the pelvic viscera were found united by adhesions. There was marked distention, and on deep dissection free gas escaped. No doubt this was due to the presence of the gas bacillus similar to that in emphysema of septic wounds. McCann, in discussing this paper, added another case of pneumoperitoneum, also produced by the Welch bacillus.

Walton, of London, reports in the *British Journal of Surgery* a long series of cases of *visceroptosis*, producing symptoms like those of many other abdominal diseases. In many of these cases there were signs like those of appendicitis. In some, the affection was thought to be carcinoma of the stomach, and in others symptoms like gall-bladder disease and chronic dyspepsia were prominent. After a complete review of a long series of such cases, Walton presents the following conclusions: (1) Visceroptosis commonly simulates organic lesions of the appendix, stomach, and gall-bladder; (2) The simulation, except in the case of carcinoma of the stomach, is generally incomplete, so that a differential diagnosis can often be made; (3) Occasionally visceroptosis co-exists with one of these lesions. This combination adds considerably to the difficulty of diagnosis; (4) The results of operative treatment are unsatisfactory; but if there is any question of the possibility of a combined lesion, an operation should be performed; otherwise medical treatment should first be carried out. (5) In the cases resembling carcinoma of the stomach, operation should always be performed lest an early neoplasm be overlooked, with grave results.

References.—*Proc. Roy. Soc. Med.* 1916, June, 85; *Brit. Jour. Surg.* 1915, Oct., 185; *Ann. Surg.* 1916, Mar., 364.

ABDOMINAL PAIN.

Adrenalin is stated by Boogher to relieve all forms of abdominal pain (*p.* 12).

ABORTION, *W. E. Fothergill, M.D.*

J. L. Bubis[1] advocates the use of **Pituitrin** in emptying the uterus during the early stages of pregnancy. The operation is not devoid of risk, because of the danger of perforating the softened wall of the uterus, and also because there is often alarming hæmorrhage. The writer does not employ preliminary packing of the cervix and vagina to stimulate uterine contraction. The patient is anæsthetized and the cervix is dilated in the usual manner. An injection of 1 c.c. is then given, and almost at once the uterine wall becomes firm and solid. The cavity can then be emptied, and the walls scraped clean with a sharp curette just as if the organ were not pregnant. Very little blood is lost during the process, and it has not been found necessary to pack the uterine cavity at the end of the operation, nor to use any hot irrigation. The writer gives three illustrative cases,

and remarks that he has emptied, by this method, many uteri in the fourth and fifth months of pregnancy in which the fœtus was dead but the cervix was closed. The entire operation need not take more than a few minutes. In some instances, after the uterus was empty the walls were so solid and firm that the sensation and sound given with a sharp curette were the same as during a curettage for a chronic endometritis.

Reference.—[1]*Amer. Jour. Obst.* 1916, i, 673.

ACIDOSIS. (*See* Diabetes.)

ACIDOSIS IN CHILDREN.. *Frederick Langmead, M.D., F.R.C.P.* According to some authorities, the term 'acidosis' implies that acetone and perhaps diacetic acid are found in the urine in appreciable quantities without associated toxic symptoms, whilst 'acid intoxication' indicates that the series of symptoms usually ascribed to diminished alkalinity of the blood and most generally recognized in diabetic coma are also present. Others use the term 'acidosis' indiscriminately for both conditions. Hence much confusion has arisen.

It is apt to be forgotten that acetone may be found in the urine in considerable amounts in a large number of states, and that by itself acetonuria is of little diagnostic significance. Routine examination of the urines of all children admitted to hospitals show that acetone can be detected by ordinary tests in a large proportion. Indeed, the figure recently given by Holt, who found acetone in 30 per cent of the urines of 200 consecutive young children, is probably below the mark. Others have found it in between 70 and 80 per cent.

J. L. Morse,[1] recognizing this prevalence of acetonuria, indicates the need for more distinctive tests before the diagnosis of acid intoxication is made. Such are the examination of the blood for abnormal acid, the determination of the amount of ammonia excreted in the urine and its relation to the total nitrogen excretion, and the determination of the carbon dioxide coefficient in the expired air. Next to the presence of acetone bodies in the urine, he points out that the most characteristic symptom is hyperpnœa unaccompanied by cyanosis, during which the rate of respiration is increased, both inspiration and expiration being prolonged, although the normal ratio between the two is preserved. He has found that in infants there is frequently a diminution, and not uncommonly a suppression of urine, and suggests that in such cases the primary cause of the accumulation of acids is a defective elimination through the kidneys. The vomiting is not characteristic, nor is the condition of the bowels, for either constipation or diarrhœa may be present. The cheeks are often flushed and the lips of a peculiar cherry-red colour. There is often a white area around the mouth.

Among the conditions which have been ascribed to acid intoxication is 'cyclical' or recurrent vomiting. Morse believes that in

most of these instances the acetone bodies found in the urine are simply a manifestation of the inanition resulting from the vomiting and starvation, but that in a few the symptoms appear to be due to the acid intoxication itself. This, however, is not the opinion of others, who hold that the acid-intoxication syndrome is only a part of the symptoms of that affection.

The symptoms of acid intoxication can also be recognized in other conditions avowedly owning a distinct etiology. Thus, as mentioned by Morse, a certain number of infants with severe diarrhœa not only pass urine containing large amounts of acetone bodies, but show the characteristic hyperpnœa and a diminution in the amount of urine passed. Most of these babies die, although the symptoms of acid intoxication may be relieved by suitable treatment. It seems evident that in these cases the acid intoxication is a consequence and not the cause of the disease, although it may be the cause of death. He also indicates the occurrence of acid intoxication in various infective diseases, such as infections of the nasopharynx, tonsillitis, and influenza. In these instances the symptoms of vomiting and prostration are out of proportion to the severity of the infection. Although possibly death in such cases is due to the acid intoxication, it is clear that acid intoxication is not the original cause of the disease. To these mentioned by Morse, many other conditions might be added in which the acid-intoxication syndrome is manifest. Among them are certain cases of pneumonia, uræmia, intestinal obstruction, and poisoning by salicylate preparations and narcotic drugs, whilst in delayed anæsthetic poisoning it plays a rôle comparable with that played by it in cyclical vomiting.

The frequency of acetonuria and of acid intoxication as a secondary manifestation must be borne in mind when reviewing the *epidemics of acidosis* which have recently attracted so much attention in America. Thus a series of 100 cases have been recorded in Concord, N.H., by Metcalf, and in 70 per cent of these, according to Morse, there was a well-defined infection of the respiratory tract or of its adjacent cavities. Another epidemic is said to have occurred in Boston, but the same writer holds that there was no scientific justification for the diagnosis of acidosis in the great majority of the cases. There were, however, during this period some unusual cases. He records five, but in only two of these, one of which was fatal, could the acid intoxication be regarded as paramount.

Treatment.—The usual treatment is to give a combination of alkalies and carbohydrates. Morse recommends a 5 or 10 per cent solution of **Bicarbonate of Soda** in a 10 per cent solution of **Dextrose** freely, both by the mouth and rectum. The bicarbonate may also be administered hypodermically in 2 per cent solution, or intravenously in a 4 per cent solution. In urgent cases dextrose may be given intravenously (2½ per cent of dextrose in normal saline). A brisk purge at the beginning of an attack is recommended by many. Howard Bucknell,[2] among others, writes of the importance of replacing

PLATE V.

CASE OF PERIMANDIBULAR ACTINOMYCOSIS

Fig. A.—Photograph showing the smooth swelling of the cheek, most marked over the angle of the jaw.

Fig. B.—Radiogram of the jaw, showing osteoperiostitis at the angle of the jaw. The carious stump of the second right molar tooth can be seen before. The affection of the bone is secondary to that of the soft tissues.

the body fluids lost by vomiting. **Water** should be given by the rectum or, if diarrhœa is present, by hypodermoclysis. He recommends also washing out the stomach and colon. **Bromide** and **Chloral** may be given by the rectum to depress the vomiting reflex, though he prefers **Chloretone**.

References.—[1]*Boston Med. and Surg. Jour.* Apr. 1916, i, 568; [2]*Atlanta Journal-Rec. of Med.* 1916, March (*N.Y. Med. Jour.* 1916, i, 996).

ACNE VULGARIS. (*See* Skin, Pyogenic Infections of.)

ACTINOMYCOSIS. *Herbert French, M.D., F.R.C.P.*

Actinomycosis in man generally takes the form of chronic suppuration of the cheek or jaw; but it is also met with in connection with the cæcum, liver, lung, and chest wall, and less commonly in other parts. It is apt to be mistaken for chronic coccal infection, for tuberculosis, or for syphilis. Were it kept in mind and tested for bacteriologically, it would be recognized with far greater frequency than it is at present. Cope[1] draws the following conclusions from the cases he has seen: Actinomycosis is an affection common in London and the vicinity, and probably also in other parts of this country. The condition is frequently overlooked and wrongly diagnosed as septic or syphilitic infection, or as sarcoma. Actinomycosis should always be considered in the diagnosis in the case of any newly-formed subacute or chronic swelling in the region of the mouth, face, neck, thorax, or right side of the abdomen. Infection with the fungus nearly always occurs from the alimentary tract.

There are two clinical forms—the hard and the soft. The hard variety softens after two or more months. Pus from every abscess should be examined as a routine practice. In any subacute or chronic lesion the discharge needs to be examined repeatedly. Peribuccal infections comprise the majority of the cases. Here the organism enters most often through the mucous membrane of the alveolar margin near a carious or erupting tooth, or through the tooth socket into the jaw. The fungus is taken in with the food, and lodges round the teeth. The features of the hard peribuccal form are very characteristic, and can often be diagnosed long before pathological investigation can give much help.

Treatment.—In certain parts of the body, and under certain conditions, actinomycosis tends to recover naturally. Treatment yields best results in the face and neck regions. Lung actinomycosis of the penetrating type cannot be controlled by any means at our disposal, and when the cæcal region is affected the prognosis is not very much better. If the lesion is in a region where the whole affected area can be removed, the prognosis is very good.

Constitutional treatment should be conducted on lines similar to those for tubercle. Good feeding and fresh air are most important in helping the body to resist any chronic infection.

Of the drugs used in treatment, the preparations of iodine are by far the most important. **Potassium Iodide** has been vaunted as

a specific for the condition. Whilst such a claim is demonstrably incorrect, there is no doubt that rapid improvement, with softening, often takes place under its influence, especially in buccal cases (*Plates V. VI*). It has been asserted that the drug acts by causing absorption of granulation tissue; its beneficial action in the granulomata of tertiary syphilis lends support to that view. To be of much value, the drug must be given in large doses up to as much as 90 gr. a day. Other preparations of iodine, such as **Iodipin,** have also been used by some, with benefit; but the writer has no personal experience of their effect. The intravenous injection of **Salvarsan** has been tried without any particular beneficial effect. Iron preparations may be necessary for the marked anæmia which develops in chest and abdominal cases.

Not much value can be attached to the local application of antiseptics to any open lesions which may be present. It is reasonable to apply a solution of iodine to any sinuses, and in view of the preference of the organism for anaerobic growth conditions, **Hydrogen Peroxide** is to be recommended as an application to abscess cavities.

Vaccine Therapy is a valuable method, but, equally with other methods, fails to make much impression on extensive thoracic and abdominal cases. Vaccines are needed both for the streptothrix infection and for the secondary infection which is so commonly present. In both instances it is better to use an autogenous vaccine; but a stock vaccine may be utilized until the more efficacious preparation is ready. The dose of the actinomycotic vaccine must be carefully regulated by the reaction which occurs in the patient. It is wise to begin with small doses (say half a million fragments), and work up to that dose which seems best for the particular patient. Doses of more than fifty million have been given. The interval of dosage also varies according to the patient's reaction under treatment; the common interval is from three to seven days. The other vaccines which may be required depend upon the organisms found by a careful bacteriological examination.

Of surgical measures, **Incision** is required to let out any accumulation of soft material or pus. Excision of the whole affected area is sometimes, but rarely, possible, and is clearly the best treatment where no important structures are involved and a speedy cure is desired. **Scraping** of sinuses may be desirable occasionally, but it is at the best an expedient, and is seldom necessary.

X-Rays are used in the treatment of some of the cases, but did not have any marked beneficial effect. Possibly softening is hastened by their aid, but certainly not to any great extent.

Radium was applied to one of the thoracic cases, with marked immediate benefit. A dose of 47 mgms. was inserted into the middle of the infiltrated base of the lung after resection of a rib, and was left in for twenty-four hours. The diseased tissues sloughed in large masses, and the change in the lung was appreciable. Whether the disease has to any extent been stayed is impossible to say yet.

PLATE VI.

CASE OF PERIMANDIBULAR ACTINOMYCOSIS—*continued*

Coloured sketch (from life) of the softened area in the same case as *Plate V, Figs. A, B.* An incision had recently been made and some gelatinous material wiped away. The central red area is therefore denuded of skin and shows the underlying granulation tissue. Granules of the fungus embedded in this tissue can be seen. The surrounding livid area represents the soft actinomycotic focus covered by thinned skin. It is rare for ulcers to occur naturally in the course of the disease. Treatment by potassium iodide caused marked improvement.

R. Clyne, del.

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The way in which actinomycosis may simulate chronic suppuration of the face is pointed out and illustrated by E. D. Newman.[2]

As a general rule the infection runs a chronic course, but occasionally it may be acute, as in the two cases recorded by Telford.[3] In each the route of infection was by the parotid duct, and the disease rapidly infiltrated the gland itself. The infection in one case was derived, no doubt, from the habit of chewing corn whilst engaged in feeding poultry: in the other the patient, a week before the onset, had played with some children in a field of ripe corn, but no more exact source of infection could be discovered. In both cases the outline of the gland, including the very distinct socia parotidis, was plainly marked: but within seven days of the onset the barrier of the glandular capsule was broken down, and the most acute diffuse cellulitis of the face resulted. The nature of the infection was determined in each case by the examination of portions of the infiltrated subcutaneous tissue in the Pathological Department of the University of Manchester.

The features of this acute form of actinomycosis would appear to be as follows: The fungus enters by the parotid duct and, within a few days of entry, gives rise to an acute parotitis: the socia parotidis is seen to be enlarged and tender. The disease then bursts through the limits of the gland, whereupon a very acute cellulitis develops which may extend far over the scalp and well down the neck. There is great constitutional disturbance and marked evidence of septic absorption. At this stage the swollen parts are likely to be incised, when the incisions will be found to yield no pus, but merely a sanious débris. The cut tissue will be seen to be diffusely infiltrated, of a dirty-grey colour, flecked with points of yellow. The fluid and débris obtained may be extremely foul, indicating a mixed infection of organisms from the mouth. The incisions, although they may ameliorate the acute condition, will probably fail to arrest the disease; and the further spread of the lesion, with fresh points of softening, will be seen. These, when in turn incised, will tend to assume a chronic course, until ultimately the diagnosis is thrust upon the observer by the yellow granules of the fungus.

The practical lesson is that any acute cellulitis of the face of obscure origin, or of unwonted appearance on incision, should excite suspicion of actinomycotic infection. The discharge from such lesions, or better, a small portion of tissue, should be examined, and, since the fungus is not always easy of identification, a single negative result should by no means be accepted as final.

References.—[1]*Brit. Jour. Surg.* 1915, July, 55; [2]*Jour. Cutan. Dis.* 1916, April, 290; [3]*Brit. Med. Jour.* 1915, ii, 534.

ADENITIS, CERVICAL. *W. I. de C. Wheeler, F.R.C.S.I.*

Tuberculous glands in the neck appear to respond more readily to treatment by tuberculin than does surgical tuberculosis in other regions. In children it will be found that in most cases the infection is from

milk, and the local trouble is associated with some tonsillar disease. The glands will subside in many cases if the milk supply is changed after testing. The child at the same time should be kept in the open air and injections of tuberculin given weekly. Gummatous or cervical adenitis is sometimes mistaken for the tuberculous variety, and arises in a greater number of cases than is generally supposed where there is no definite history or other specific lesions. It is difficult to diagnose histologically between tuberculous and gummatous adenitis. It is probable that the two processes may affect the glands of the neck at the same time. Pearce Coues,[1] in regard to the question of syphilis in tuberculosis, quotes a paper as stating that in 45 out of 46 cases of syphilis a positive tuberculin reaction was obtained.

Reference.—[1]*Boston Med. and Surg. Jour.* 1915, ii, 777.

ADENOIDS. *John S. Fraser, M.B., F.R.C.S.*

Oertel[1] says there is good ground for believing in the direct relation of follicular conjunctivitis to nasopharyngeal 'adenoids.' The normal conjunctiva contains many small lymph-nodes, the so-called 'solitary follicles.' Follicular conjunctivitis is manifested by a hyperplasia of these follicles, most marked in the fornix. The disease arises under the influence of bad hygienic surroundings, but it is frequently seen in a mild form, especially among children during their school years, and particularly if they are anæmic.

On examination, the conjunctiva of the lower retrotarsal fold presents a variable number of small, round, pinkish, translucent bodies, each about the size of a pin-head ; when abundant they are arranged in rows. These follicles consist of circumscribed aggregations of lymphoeytes identical in structure with the granulations of trachoma. Follicular catarrh is sometimes looked upon as an early stage of trachoma. This is regarded as unlikely by most authorities, since there is neither papillary hypertrophy, cicatricial change, nor other sequelæ. Further, there is no evidence of contagiousness, and the affection subsides without leaving any traces.

Oertel has recently examined 818 children, most of whom came from poor stock, lived in unhygienic surroundings, and were poorly nourished. Of these, 127 had follicular conjunctivitis and enlarged nasopharyngeal tonsils. In all but two there was also marked hypertrophy of the faucial tonsils.

Oertel considers forceps, knife, and snare the best instruments for removing the faucial tonsils. Chloroform anæsthesia is preferred. To remove adenoids, he uses the La Force adenotome. A small curette is employed later, or Oertel's own forceps. The wounded surfaces are swabbed with pure compound tincture of benzoin. He concludes that eye adenoids (follicular conjunctivitis) indicate the existence of throat adenoids. Adenectomy should be performed, as far as possible, under direct observation.

Kaempfer gives a favourable report of **Coagulen** as a hæmostatic in nasopharyngeal operations (*p.* 14.)

Reference.—[1]*Ann. Otol. etc.* 1915, Dec.

ADHESIONS AND CONTRACTURES. *W. I. de C. Wheeler, F.R.C.S.I.*

The development of scar tissue in excess, renders futile any surgical effort to restore normal function. Allen B. Kanavel[1] discusses this subject and records results after five years' experience. He recommends the transplantation of free flaps of fat. The fat was generally obtained from the abdominal wall, but in some cases where the fascia lata was also required, the leg was found preferable. In some cases the transplants persisted in spite of infection, and there was never difficulty if the field was aseptic. No sutures were used to retain the flap, and care was taken to prevent hæmatoma. Fat was transplanted in cicatrices to soften them, to restore mobility, and to repair deformity. One patient had suffered from a burn of the face, with a consequent drawing down of the lower lip, and continuous oozing of saliva from the mouth. Free mobilization of the injured lower portion of the face allowed the lower lip to be raised to cover the teeth, but it was still everted and immobile. At a second operation the scar tissue was undercut to the distance of about 1 in., a flap of fat half an inch thick was transplanted from the abdomen, and the wound stitched to correct the eversion. In this case the replacement of scar tissue by fat appears to have had an excellent result. Two years afterwards the fat was still in situ, with no evidence of absorption. Free flaps of fat were also transplanted round the axillary vessels to prevent œdema after radical operations for removal of the breast. Four cases fell into this group : but while the writer considers Murphy's method of utilizing some of the pectoral muscles to cover the vessels and nerves in the axilla in the form of a flap dangerous, owing to the possibility of cancer metastasis, yet his own results after free transplantation of fat were not satisfactory. He found that a transplant in such a large wound, in which some bacteria are always present, is attended with much risk of infection.

Kanavel's experiences in fat-transplantation in cases of operation upon injured nerves have special interest at the present time. In one case, where the patient was injured in a saw-mill, all the flexor tendons and the median and the ulnar nerve were severed above the wrist. After six months' severe infection the nerves and tendons were dissected free and united by silk. In the case of the median nerve, even after free mobilization, the ends were separated for $1\frac{1}{2}$ inches. A vein was removed from the leg, and through it were drawn several fine strands of silk ; the ends of the vein enveloped the ends of the nerve ; free flaps of fat from the abdomen were laid under the tendons and round the nerves. Sixteen months afterwards it is said the result was satisfactory. The patient works as a mill hand, and sensation is present. In connection with this case it is of interest to remember that the suture of the median nerve to a tendon is a common mistake. Kanavel refers to four such cases.

Altogether Kanavel gives details of thirty-two cases. In four (all of the breast) infection occurred, with loss of the fat. It seems, however, safe to say that fat can be transplanted with the assurance

that it will not act as a foreign body. The greatest value of the method is to be found in its use as a protection about vessels and nerves, and in plastic operations to restore mobility and remove disfigurement.

M. Petit[2] refers to two cases where a fat-fascia flap was avoided by using sterile rubber tissue to prevent tendons becoming adherent to the skin. Healing was by first intention, and the function of the tendons was perfect. In one case the rubber tissue was extruded, but this did not interfere with the final result.

References.—[1]*Surg. Gyn. and Obst.* 1916, ii, 163; [2]*Rev. de Chir.* 1916, Jan. (*Med. Rec.* 1916, ii, 200).

ALCOHOLISM. (*See* Delirium Tremens.)

ALOPECIA. *E. Graham Little, M.D., F.R.C.P.*

Sibley[1] remarks that treatment in the majority of cases of premature alopecia resolves itself into the treatment of seborrhœa capitis, and especially recommends **Resorcin**; a 2 per cent solution in water should be rubbed into the scalp daily. Soaps must be avoided while using resorcin, as the combination stains the hair. The following prescription meets this requirement :—

℞	Resorcin.	gr. x	Tinct. Quillaiæ	℥xv
	Ol. Ricini	℥xxx	Aq. Rosam	ad ℥j

Of the tarry preparations, **Liquor Carbonis Detergens** for a watery and **Oil of Cade** for an oily preparation will be found the most useful :—

℞	Ol. Cadini		Paraffin. Liq.	ad ℥j
	Spt. Vini Rect.	āā ℥x–lx		

If the scalp is red and inflammatory, the following are useful prescriptions :—

℞	Liq. Carbon. Deterg.	℥xx	Glycerini	℥x
	Acid Hydrocyan. Dil.	℥v	Aq. Rosam	ad ℥j

or,

℞	Liq. Plumbi Subacet. Fort.	℥x	Glycerini	℥xxx
	Liq. Carbon. Deterg.	℥xv	Aq. Rosam.	ad ℥j

Salicylic Acid, a most useful preparation in seborrhœa, is insoluble in water, and requires a considerable amount of spirit to dissolve it, but in cases of an oily seborrhœa it is very beneficial.

Sulphur, another favourite preparation for seborrhœic conditions, can only be applied in a lotion in suspension. **Ichthyol** is soluble in water, and may be substituted : its colour and odour, however, are objectionable. **Thiol** and **Thigenol** are also useful for lotions.

Ionization with zinc salts may promote a recovery in quite long-standing cases. Treatment should be applied for two or three days a week for several months. In cases of severe seborrhœa, **Vaccines** of the acne bacillus, 5 to 200 million, continued for a sufficient time, are recommended. **Massage** of the scalp acts well in improving the circulation and freeing the skin from too stiff an adhesion to the skull.

Stein[2] offers the interesting explanation of the prevalence of baldness in men as compared with women in the relation of the sexual and sebaceous glands. In men "the assumed hormone from the genital glands which apparently stimulates the sebaceous glands to keep up their work, is continuously produced, while in women there is no further opportunity after the menopause for this hormone to be produced, and hence the sebaceous glands in the scalp lack this constant stimulus to functioning. A woman's scalp is also shielded by the long hair, so there is less sebum needed to protect it against chilling."

References.—[1]*Pract.* 1915, ii, 807 ; [2]*Jour. Amer. Med. Assoc.* 1916, i, 846.

ALOPECIA AREATA. *E. Graham Little, M.D., F.R.C.P.*

Freshwater[1] analyzes 100 cases of this disorder under his observation.

Etiology.—There was no appreciable preponderance among the dark-haired or the male sex, the figures being 51 and 56 respectively. A family history of a previous similar alopecia was high, viz., 67 per cent, but probably many of these cases include diseases such as ringworm and other scalp maladies. Seventy-two per cent of the cases were between the ages of ten and twenty. A history of syphilis was obtained in 8 per cent ; of headache in 66 per cent ; and of neuralgia in 42 per cent. Dental caries was present in nearly every case ; this proves nothing, for nearly all patients, both private and hospital, have faulty teeth.

There are four main theories as to the causation ; (1) *Neuropathic*, supported by certain of the features of typical cases, viz., history of shock, frequency of concomitant neuralgia, dystrophies of the nails, rapid fall of the hair, and the occasional restriction of the bald patch to the area of segmental distribution. (2) *Parasitic* : certain well-reported epidemics point to this conclusion, but no bacteriological proof is supplied. (3) *Endocrinous* : the fall of hair is not infrequently associated with disturbance of function of certain glands, notably the thyroid and sex glands. Thus it is common in women at the climacteric. (4) *Auto-intoxication*, from absorption of intestinal or oral septic products.

Treatment.—This should correct the faults in general hygiene so often associated with this condition. Particular attention should be directed to the mouth for defective teeth, the throat for adenoids, and the eyes for errors of refraction. Next, the general condition of the nervous system should be considered. Mental depression and headache are not infrequently complained of ; in fact, headache is so often met with in alopecia areata, that a connection between them seems certain, but so far this has not been shown to exist. For such cases, **Tonic Treatment** is indicated by means of arsenic, phosphorus, iron, cod-liver oil, quinine, and strychnine ; **Sea-bathing, General Massage,** and **Electricity** are of value for their stimulating effects.

The only drug that directly influences hair-growth is **Pilocarpine,** and its action is by no means marked : it may be given in tabloids, gr. $\frac{1}{8}$ to gr. $\frac{1}{4}$, by the mouth, or injected hypodermically in doses of

$\frac{1}{30}$ to $\frac{1}{10}$ gr. The patient requires careful watching during its administration, on account of its inhibitory action on the heart-muscle, as well as the excessive perspiration produced, which renders him very susceptible to chills; it is therefore advisable to order flannel to be worn day and night next the skin during its administration.

A combination of **Thyroid and Pituitary Glands** has given good results in some obstinate cases. For local treatment the following application combines the effect of an antiseptic and stimulant :—

R	Hydrarg. Perchlor.	gr. $\frac{1}{2}$	Chloral. Hydrat.	gr. x
	Acid. Acetic. Glac.	℥iij	Spt. Vini Rect. (60 %)	ad ℥j
	Resorcin.	gr. v		

To be rubbed in twice a day with a stiff brush.

Other measures recommended are to paint the bald area with **Liq. Epispasticus,** or with a 12 per cent lotion of **Lactic Acid,** or with **Chrysarobin Paint** (chrysarobin 1, traumaticin 10). The application of **Ultra-violet Rays** is sometimes very effective, as for example by the Finsen or mercury-vapour lamp. Exposures may be given three days a week. Bier's **Suction Cups** applied to the bald area for five minutes twice a day are of much service. The **Faradic Current** applied daily with a wire brush is also useful.

REFERENCE.—[1]*Pract.* 1915, ii, 796.

AMŒBIASIS. *Sir Leonard Rogers, M.D., F.R.C.P.*

Amœbic dysentery has been very prevalent among the troops in the Near East, both in Gallipoli and Egypt, where **Emetine** hypodermically has fully maintained its reputation. Valuable experience has been recorded during the past year, both by Army doctors and in America, regarding the still debatable questions of the dosage and duration of the use of the drug, in order to obtain complete and permanent cures.

R. Lyons,[1] of New Orleans, discusses fully the action of emetine and methods of using, and records an experiment to prove that sterilized extracts of stools of patients receiving ipecacuanha had no effect on amœbæ, showing that the stools contained none of the amœbicidal constituents of the drug. He doubts if the active principle is excreted in the bowel, but thinks that its action is only on the amœbæ in the tissues, and that after they have been destroyed the lesions readily heal. Next, he discusses relapses, and records that, during the intervals of apparent health, in the great majority of cases some abdominal discomfort persists, showing that the organisms are still embedded in the tissues ready to multiply and reproduce the disease. In discussing the modes of administration, he thinks that when emetine is given by the mouth it is absorbed into the blood before acting, while the drug is highly irritating to the intestines and may produce diarrhœa even in non-dysenteric subjects, and he advises that it should only be given by the mouth when its hypodermic use is not possible, and then only in doses of from $\frac{1}{6}$ to $\frac{1}{3}$ gr. He has also found emetine to be irritating when given as an enema. With regard

to dosage and duration of treatment he advises 1 gr. a day continued for five days after bowel symptoms have disappeared. He points out that large and long-continued injections may produce diarrhœa, which ceases on stopping the drug. If the dosage is not excessive, ill effects are very rare. Slight peripheral neuritis has been recorded several times. Serious symptoms have also followed large doses intravenously, but do not occur if Rogers's original 1-gr. dose is not exceeded. About 25 per cent have recurrences. In such cases Chauffard's plan of repeating the injections with two and three weeks' intervals is useful.

N. Barlow[2] also discusses relapses after emetine on the basis of fifty-eight carefully recorded cases followed up for at least six months, and he comes to the conclusion that anything less than nine days' treatment of at least one grain daily is almost certain to be followed by a relapse. After five or six days it may be replaced by large doses of **Ipecacuanha**; but emetine continued for two weeks or more gives better ultimate results. It should not be continued for more than two to four weeks, or intestinal irritation may be produced. After intervals of a week to ten days the drug may be resumed. The percentage of cures was higher when no laxatives were given, or even where opiates were administered. **Bismuth** may be used in the intervals without emetine or ipecacuanha. A single full daily dose was better than two smaller ones. About 80 per cent of amœbic dysentery cases remain free from the disease for seven or more months if treated for ten days or more with 1 gr. daily. The simultaneous administration of ipecacuanha does not diminish the relapses, but its subsequent administration does so.

Opiates help the cure, and purges retard it by removing the emetine too quickly. The stools should be examined every six months for cysts after a saline purge, and if found, nine days' emetine treatment should be given.

Ronald Ross[3] has given his experience of the treatment of dysentery while consultant in Egypt, and a discussion at Alexandria,[4] in which he also took part, resulted in much valuable experience being placed on record. Ross, in an historical introduction, mentions that he learnt from McClean the value of ipecacuanha in dysentery, and he found amœbæ in stools in dysentery and diarrhœa cases as early as 1896 in India. In July and August, 1915, an epidemic of amœbic dysentery appeared among the troops near the Mediterranean and Red Sea, although previously they had been rare. The disease was much more virulent among British than among Indian troops, and as the earlier the treatment the better the results, orders were issued for emetine to be injected in all cases as soon as possible, without waiting for microscopical examination, with the result that the cases became less grave. He does not think any ill effects resulted from the drug, but experience showed that after about ten days it was advisable to omit it for a time, especially if it did not appear to be doing good. In about 15 per cent the disease became chronic, mostly in cases which were treated late and had very extensive destruction of the bowel

wall. Some cases do not show dysenteric symptoms and may be overlooked. He thinks enemata are rarely advisable in acute dysentery, and then only a weak solution of permanganate or quinine should be given. He is opposed to appendicostomy. Liver abscess most frequently follows undiagnosed amœbic disease.

McCarrison, at the Alexandria debate, said that 9 per cent of the Indian casualties from the Mediterranean were dysentery and the mortality nil, purgative treatment alone usually sufficing. He preferred $\frac{1}{2}$-gr. doses of emetine twice a day. **Thymol** and **Calomel** combined were more effective in removing cysts, while quinine enemata did not destroy them. Kerr in 24 post mortems found amœbic dysentery in 20 and bacillary in 4, while microscopical examination of the stools showed amœbæ in 50 to 60 per cent. In severe cases with collapse, he gave 20 c.c. doses of **Antidysenteric Serum,** while **Intravenous Salines** were often given. **Emetine** was of great value. Lavage of the large bowel did not prove satisfactory.

A. H. Lister gave emetine in four-day courses with an equal interval, and found it to be very efficient. In cases in which emetine failed, antidysenteric serum sometimes did good. In cases with very low blood-pressure, good resulted from one and a half pints of normal saline subcutaneously, combined with 10 min. of 1 per cent adrenalin hypodermically every four hours. Hiccough was a bad sign, but atropine may give temporary relief.

T. S. Novis advocated 2 gr. of **Ipecacuanha** and of **Tannic Acid** every second hour. Emetine during convalescence lessened the liability to liver abscess. F. Oppenheimer advocated a fairly liberal diet. He obtained excellent results from $\frac{1}{2}$-gr. doses of emetine twice daily for fourteen days. Ipecacuanha had not been successful on account of vomiting. **Dover's Powder** at night gave sleep.

Tubby said no surgeon would advise appendicostomy in acute dysentery, and he did not advise it even in chronic cases, as peritonitis was liable to follow from lack of adhesions. J. A. Delmerge gave emetine up to 15 gr. in one set of cases, and only to 4 gr. in another series, but found no difference between them. Cases kept on a low diet for a long time improved more rapidly than those in whom it was increased earlier.

S. Kartulis spoke from thirty-two years' experience in Egypt of the good results following **Irrigation** of the large bowel with 0·5 per cent **Tannic Acid.** He testified to the very great value of emetine, although it sometimes failed to act on living amœbæ. Quinine irrigation of liver abscesses had not succeeded in his hands, but in three cases three or four hypodermic injections of 20 per cent solutions of tannic acid were followed by disappearance of the amœbæ from the discharge and healing of the abscess, and he had used the same injections against amœbic dysentery with the same success as with emetine, although it also sometimes failed. He now combined emetine injections with tannic acid enemata, using tannic acid 4, iodoform 3, sodium chloride 6, arrowroot 25, and aqua

distillata 1000, two enemata being given daily, to be retained for fifteen to twenty minutes, and repeated for three or four days. In 400 cases treated thus he had no death, while he had seen only four deaths in 3000 private cases in his whole experience. H. Crean had tried enemata of equal parts of hot saline and of normal **Eusol** once a day for four days, with the effect of lessening the number of stools. G. Hall and C. W. Healy referred to fatal cases after emetine injections, mostly several days after the drug had been discontinued, but found no evidence that any were caused by emetine. Surgeon-General Babtie noted with satisfaction the unanimous opinion as to the value of emetine, the risks of which with due care were very small.

H. H. Dale[5] reports some experiments in cats showing that persistent large doses of emetine may produce diarrhœa, as Lyons[1] had previously pointed out from clinical experience. Low[6] has written a general summary of our knowledge of amœbic dysentery.

Dale[7] also records the use of a new preparation of emetine, the **Double Iodide of Emetine and Bismuth,** in the treatment of carriers of the encysted stage of the *Entamœba histolytica*. Although in Egypt it was found that a full course of 10 to 12 gr. of emetine hydrochloride hypodermically practically always eradicated the infection, among cases invalided to England some showed a recurrence of the cysts in the fæces, followed by recurrence of the disease, possibly due to persistence in a partially healed ulcer. He therefore tried Du Metz's suggestion of giving double iodide of emetine and bismuth by the mouth in 3-gr. doses, which is equivalent to 1 gr. of the hydrochloride, in ten cases which had all shown recurrence of the cysts after the latter drug. Six have been discharged cured after the cysts had been absent for six weeks. A seventh case relapsed once, but is now free for four weeks; an eighth could not stand the treatment on account of vomiting, and one relapsed after two courses of 30 to 36 gr., usually given in 3 gr. a day.

G. C. Low and C. Dobell[8] report three cases treated by the same method at Dale's suggestion, and found that in a fresh infection the amœbæ rapidly disappeared, while in the second and third the cysts were soon got rid of. The new drug given by the mouth produced much more disagreeable symptoms than the hydrochloride by the needle; in two cases it had to be stopped after five days. (*See also p.* 17.)

B. J. G. Thomson and D. Thomson[9] have published a memorandum on the prevention of amœbic dysentery, mainly by curing cases, disinfecting fæces, and prevention of flies. They recommend daily 1-gr. doses of emetine, and never its intermittent use, for from seven to twelve days, and occasionally more in chronic cases, which nearly always suffices to prevent the patients becoming cyst-carriers.

J. P. Bates[10] writes on a long experience of treatment by **Ipecacuanha** and **Bismuth,** mainly before the introduction of emetine. He advocates the use of large doses of bismuth after a course of ipecacuanha or emetine, to help to heal the ulcers and prevent the encystment of surviving amœbæ.

P. I. Nixon[11] reports a further case in which a long course of emetine had failed to cure the patient, but **Chaparro Amargosa** was successful.

K. M. Lynch[12] has found amœbæ resembling *Entamœba histolytica* in rats, which may be communicated from one to another artificially or by close contact, and suggests these animals as a possible source of human infection.

References.—[1]*Amer. Jour. Med. Sci.* 1915, ii, 97 ; [2]*N. Y. Med. Jour.* 1915, ii, 845 ; [3]*Lancet*, 1916, i, 1 ; [4]*Brit. Med. Jour.* 1916, i, 142 ; [5]*Ibid.* 1915, ii, 895 ; [6]*Pract.* 1916, Mar., 320 ; [7]*Lancet*, 1916, ii, 183 ; [8]*Ibid.* 319 ; [9]*Brit. Med. Jour.* 1916, i, 881 ; [10]*Jour. Amer. Med. Assoc.* 1916, ii, 345 ; [11]*Ibid.* i, 946 ; [12]*Ibid.* 1915, ii, 2232.

AMPUTATIONS. *W. I. de C. Wheeler, F.R.C.S.I.*

A practical study of the numerous limbless patients congregated in various centres as the outcome of the war, makes it possible to view amputations in the light of the practical value of the stumps obtained. The treatment of the main nerves requires more attention than is usually bestowed by those who are responsible for the actual operation but are not actively concerned in the end-treatment of the case. Marmaduke Sheild[1] draws attention to this fact, citing his practice of resecting the main nerves above the end of the stump. He writes as follows :—

It does not much prolong the time taken in an amputation if the main nerves are drawn well out of their fascial envelopes and an inch or more of them cut away with sharp scissors. The leaving of the nerves 'long' in a stump, to be entangled and pressed upon by scar tissues, is responsible for those painful 'neuralgic' stumps which are at once a source of intolerable suffering to the patients and of despair to those who have to fit them with artificial limbs. Furthermore, the primary dressings, if the main nerves are not left in the stump, are far less painful. This is a matter of no small moment in the many amputations now done through septic tissues, where the flaps do not heal easily, where subsequent cicatricial tissue is very dense, and where packing of the stump with salines or other applications has to be resorted to. In all the amputations of the leg and upper extremity, shortening of the main nerves is very important. In the case of the thigh the sciatic nerve retracts, as a rule, and does not give trouble. In amputations of the leg, especially by the long external flap (Farabeuf's method), the anterior tibial nerve, if not removed, is actually laid across the end of the bones! In amputations of the arm I have in the past seen the greatest trouble from nerve involvement in the stump.

I have only recently operated upon a case of 'neuralgic' stump near the shoulder by resection of the main nerves above. I found the median and ulnar nerves swollen, inflamed, and doubtless terminating in the 'bulbous' ends so familiar to pathologists. This operation was successful, but the unhappy patient had suffered excruciating pain, and had actually contemplated suicide. I have seen a considerable number of such cases in past practice. I am not

aware that the 'shortening' of the main nerves is prominently alluded to in the text-books on operative surgery.

Tuffier[2] gives an illuminating account on the functional status of amputation stumps in war. He analyzes 622 cases of amputation of the upper extremity and 1109 cases of the lower. He states that secondary operation is often necessitated by the performance of the classical circular incision, and that this simple and rapid method cannot enter into the good practice of war surgery. The flap methods need a higher bony section, a disadvantage which can be offset by the well-padded extremity of the stump. He asks. If the old imperfect circular method cannot be abandoned, cannot the results be improved by choosing the proper time for this operation ? Immediate amputation eliminates the great majority of secondary accidents. but. on the other hand, it sometimes destroys a limb which might possibly be saved.

Neuritic pains reveal two causes easily distinguished by the seat of their maximum intensity. A radiograph may show a normal bone, yet the stump may be painful. The pain is usually found over the cicatrix, and can be elicited by pressure. But a nerve may also be stretched across a bone, and then the maximum pain is found at the point of traction itself. In the first case the cicatrix could be removed and the neuroma found. In the second case a higher neurotomy will be required. Surgeons should pay closer attention to the articulation adjacent to the amputation. A hip amputation should be made as low as possible. In the case of the hand, the smallest stump including but the thenar eminence and portion of the metacarpal bones gives services infinitely greater than the most perfect artificial hand that can be substituted. A dorsal cicatrix is preferable. The author emphasizes that amputation too close to the elbow does not make allowance for the attachment of an apparatus for flexion. A few centimetres often increase the value of the member 50 per cent. Movement of the joint, and especially of the radio-cubital articulation, should be carefully watched during cicatrization. The head of the humerus should, if possible, be saved in cases where disarticulation of the shoulder-joint is contemplated. From a functional point of view, very short shoulder stumps are of no use, and an arm can only be furnished for the sake of appearance.

Didier[3] describes a metal retractor to assist in the performance of amputation. *Figs.* 2 and 3 show the retractor and the method of its application.

G. A. Wright[4] raises objections to the plane circular section in war surgery. He says : The arguments in favour of cutting through a limb by straight plane section of everything, including the bone appear to be : (1) That the wound is quite open, and there are no recesses in which poisonous matter can collect ; and (2) That where there is great prostration, this is the quickest and easiest way of severing the part. To the obvious objection that the bone is left uncovered and protruding, the answer is given that the operation is only meant to

meet an immediate risk, and that everything can be put right by a secondary amputation under more favourable conditions.

The state of the stumps in the cases admitted to hospital since May, 1915, has driven us to consider whether it is desirable that this procedure should be continued. The stumps show a large area, sometimes several square inches, of granulating surface, with bone exposed and protruding more or less beyond the level of the soft parts. Though the granulating area heals over in time, and the size of the wound is much lessened by contraction, there is a great delay in heal-

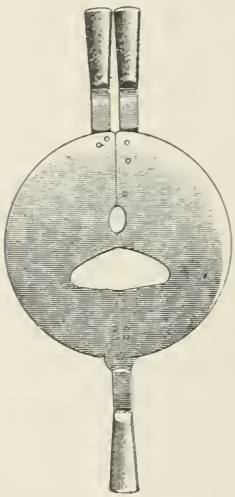


Fig. 2.—Didier's retractor.

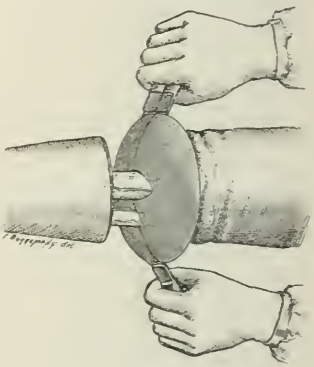


Fig. 3.—The retractor in operation.

ing, and the process is either incomplete or, at best, a large thin cicatrix results. . . . The main objections to this return to the methods of antiquity are :—

1. If the wound can be got to heal at all, without further operation, it takes many weeks, or even months, to do so.

If the wound heals, a large adherent scar is left with the bone pressing against it. Such cicatrix is prone to all the diseases immediate and remote to which scars are liable, such as ulceration, pain, etc.

3. If, on the other hand, a further operation is proposed, as was originally intended, we find that after all they have gone through, men are naturally not always ready to submit to another operation. When a further operation is agreed to, it is not always easy to decide upon the best procedure, or always possible to get a good result. If the less severe process of clearing an inch or two of the bone and sawing it off is adopted, the process of healing is still slow and the cicatrix is not by any means always satisfactory.

4. If a more formal re-amputation is performed in the thigh or upper arm, the result means often a serious addition to the difficulties of fitting an artificial limb, and may make it almost impossible to give the patient useful mobility in the stump and control over the appliance provided.

Unless there are really some other great advantages to balance the disadvantages, ease and speed alone are not sufficient recommendations. As regards a free outlet for discharge, either a flap operation or oblique section—i.e., the 'elliptical incision' ('oblique circular of Hardie')—provides quite as free vent if the wound is kept open till danger is past. If desired, it would be easy to fasten back the flaps and fix them open for a time, and then bring them together when it was safe to do so.

Fitzmaurice Kelly[5] takes the other view, for the following reasons: (1) It saves life; (2) It saves length of limb, any subsequent retraction being regained by extension; (3) The risk of secondary hæmorrhage is lessened, this complication practically never occurring where a flapless operation is performed; (4) It arrests the spread of infection, whereas in flap amputations sepsis often recurs in the flaps and spreads up from their base: (5) It is possible where no other method is possible.

Openshaw[6] thinks that the plane or modified amputation without suturing may be necessary in gas gangrene, but that there is no reason why flaps should not be cut and the wound left open in other cases. In this contention he is supported by Tuffier. In amputations about the hip, a long flabby stump is a disadvantage when trying to fit an artificial limb. In amputation through the thigh, any shaped flaps may be cut, so long as the bone is well covered; the longer the piece of bone which is left, the better from the artificial-limb point of view. Amputation through the condyles gives a good functional result. The patella should be removed; otherwise it is drawn upwards on the thigh and prevents accurate fitting of the artificial limb.

Openshaw thinks that the Stephen Smith amputation through the knee-joint is the only one worth considering; but the fitting of the artificial limb in this case is a matter requiring considerable skill. No amputation gives better results as regards gait than at the seat of election below the knee. If only one inch of tibia is left, the results from the artificial-appliance point of view are far better than if the amputation is through the knee. Amputation through the lower part of the leg has no advantage over amputation at the seat of election.

In war time the stump may not be ready for fitting of a limb for many months. Openshaw mentions the following conditions which prevent the artificial limb being fitted, and, like other writers, emphasizes the necessity of cutting the nerves short at operation. (1) Bulbous nerves; (2) Painful, conical or spiculated bone; (3) Necrosis of bone; (4) Sinus leading to bone or foreign body: (5) Inflammation; (6) Abscess; (7) Dense adherent, puckered, eczematous scar;

(8) Presence of ulceration ; (9) Stump loose and flabby ; (10) Stump very fat ; (11) Limb contracted.

Finochietto[7] recommends that the patient should be placed in ventral decubitus during the performance of some amputations of the

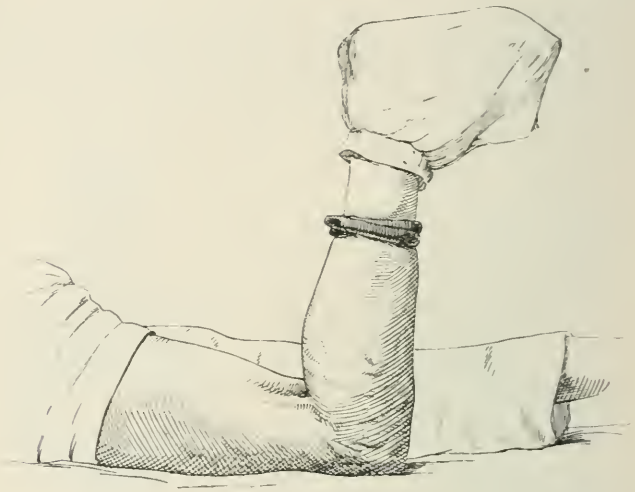


Fig. 4.—The patient is in ventral decubitus. The leg to be operated upon is in flexion. Guyon's tube rolled up.

leg. *Fig.* 4 depicts an amputation below the knee-joint with the patient lying on his face. The writer has not experienced any difficulty with the administrations of anæsthetics while the patient is in this position.

Arm Amputation.—It has been brought forcibly home to those working in the orthopædic centres that, however satisfactory the

Fig. 5.—Brushmaking. The thread attached to the end of the crotchet.

artificial substitute for a lower limb may be, in the case of the upper limb, however low the amputation and however perfect the stump,

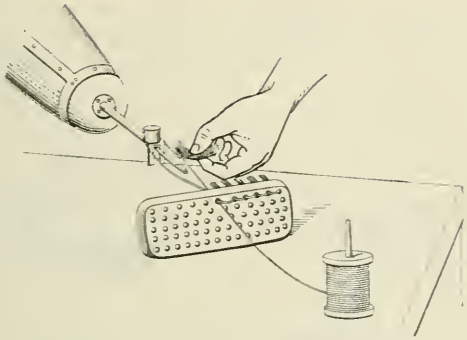
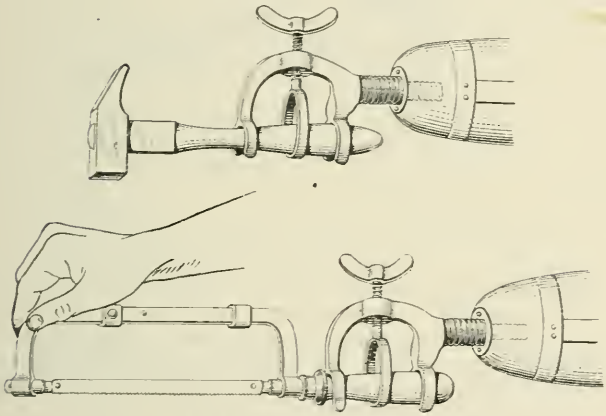


Fig. 6.—Brushmaking. Fixing the bundle of bristles.



Figs. 7, 8.—Nyrop's hammer and saw handles.

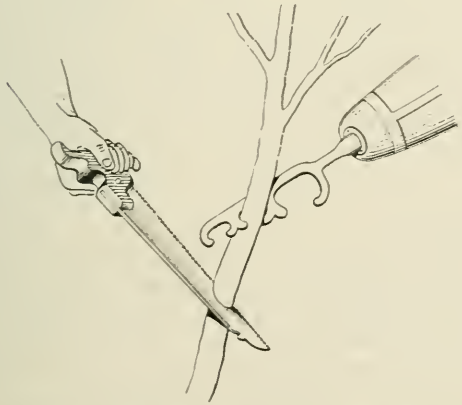
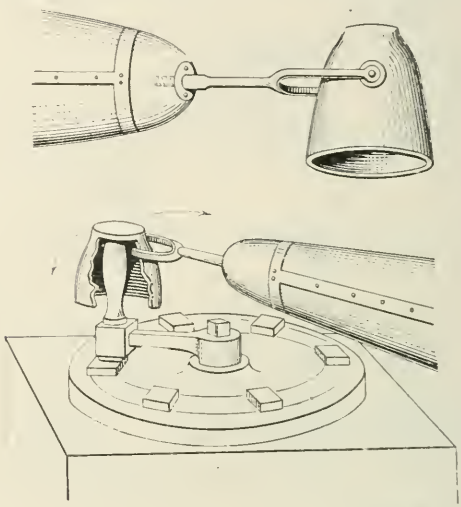


Fig. 9.—Gripouillean's clutch for use in tree-pruning.

the loss of the hand is irreparable. Ducroquet[8] writes an interesting paper on the various contrivances by which men having lost their arm are still enabled to become useful citizens and carry on their



Figs. 10, 11.—Appliance for use by electric motor drivers, etc.

ordinary avocations. The illustrations (*Figs.* 5–11), selected from many others, speak for themselves.

References.—[1]*Brit. Med. Jour.* 1916, ii, 273; [2]*Surg. Gyn. and Obst.* 1916, ii, 148; [3]*Arch. de Méd. et Pharm. Militaire*, 1916, Feb., 193; [4]*Lancet*, 1915, ii, 810; [5]*Brit. Jour. Surg.* 1916, April, 676; [6]*Pract.* 1916, Mar., 284; [7]*Ann. Surg.* 1915, ii, 616; [8]*Presse Méd.* 1916, July.

ANÆMIA IN CHILDHOOD. *Frederick Langmead, M.D., F.R.C.P.*

As H. Z. Giffin[1] points out, two forms of splenic anæmia may be met with in children—the splenic anæmia of adult type and the splenic anæmia of infants (von Jaksch's disease, anæmia pseudo-leukæmica infantum). The adult form very rarely occurs in children under two years of age, whilst splenic anæmia of infancy is practically confined to infants under two and a half. In the splenic anæmia of infancy there is more evidence of blood destruction than in the other form; the red-cell count is likely to be lower and the colour index higher, and normoblasts and megaloblasts are present. In the adult form there is no leucocytosis; in splenic anæmia of infancy, lymphocytosis is obvious. Giffin has collected five cases, to which he adds another, of anæmia of the adult type occurring in infancy, for which **Splenectomy** was performed, and four cases where this operation was done for the splenic anæmia of infancy. Of the first group, in not all was the diagnosis established beyond doubt. Three ended in complete recovery, two doubtful cases ended fatally, and one had

improved but was still under observation. Of the second group, three ended in recovery, and in one (that of a premature child) improvement was only temporary.

The author shows that whilst the two conditions have many characteristics in common, and are closely related, they have also certain distinctive differences and should, at present, be sharply separated.

Reference.—[1]*Ann. Surg.* 1915, ii, 679.

ANÆMIA, PERNICIOUS. *Herbert French, M.D., F.R.C.P.*

Treatment by **Splenectomy** finds fresh advocates. Five cases are reported by Lee, Vincent, and Robertson.[1] All were advanced cases, in whom any other treatment seemed hopeless. Most had been invalids for upwards of a year previously; all consented to the operation, although it was put before them as being essentially experimental. No case was cured, but all improved markedly and rapidly, the red-cell count reaching 4 or 5 million; and the rate of temporary recovery was so rapid that it appears attributable directly to the splenectomy. The blood-picture never became normal, however; although the colour-index fell to 1 or below 1, the other characters of the red cells remained those of pernicious anæmia; and in three of the five cases evidence of increased blood-destruction was still present in the form of urobilinuria several months after splenectomy. It is difficult to say as yet whether the duration of improvement after splenectomy is longer than the remissions which follow arsenical treatment, but the facts appear to suggest that this may be so. It is at least clear that splenectomy is an operation which pernicious anæmia cases bear well, even when their blood-count is at a low ebb; that it is followed by a rapid remission; and that this remission is likely to be more pronounced than that brought about by other known therapeutic measures.

Six further cases of pernicious anæmia treated by splenectomy are reported by Percy,[2] all of whom did well, though the author wishes more time to elapse before he records the actual degree of success attained by the operation. In all his cases the operation was preceded by massive transfusions of human blood to the extent of as much as 500 c.c. on successive occasions. The special method of blood transfusion he advocates—from vein to vein instead of from artery to vein—is mentioned in the article on Blood, Transfusion of p. 113.

References.—[1]*Jour. Amer. Med. Assoc.* 1915, ii, 216; [2]*Surg. Gyn. and Obst.* 1915, ii, 360.

ANÆSTHETICS. *J. Blomfield, M.D.*

Two subjects which have largely occupied the attention of anæsthetists during the past year are the administration of warmed vapours and the use of nitrous oxide and oxygen during long operations. The advantages claimed for warmed over unwarmed vapours are that there is a saving of the patient's energy, since none is expended in raising the temperature of the anæsthetic to that of the body, and that less anæsthetic is required to produce narcosis when the vapour

is applied warm. It is also asserted that undesirable after-effects are much less frequent. As will be seen from articles quoted later, the case cannot yet be regarded as established in favour of warming anæsthetics, i.e., it has yet to be shown that so material a benefit accrues as to compensate for the necessary additional complication of apparatus.

Similarly, although there is a large amount of opinion which approves of prolonged administrations of nitrous oxide and oxygen, there is also, on the other hand, emphatic declaration that this is amongst the most dangerous of procedures.

The Use of Nitrous Oxide and Oxygen during major operations, which has been the practice in some parts of America for several years and is increasing in favour in Great Britain, has given rise to much controversial writing during the past year. It is the combined employment of local anæsthetics, following Crile's method, that has so widely extended the field over which nitrous oxide can reign as the anæsthetic of choice. The increased use thus brought about has led inevitably to the discovery of disadvantages that were barely perceived when the gas was used only during short operations. At the present time, while we find those who declare nitrous oxide and oxygen, for major operations, to be the most dangerous of anæsthetics, equally positive are those who describe it as the safest. As is so often the case, truth probably lies between the two views, and whether the method is very safe or very dangerous depends largely upon the kind of individual *to* whom, not to mention *by* whom, it is administered. It becomes, therefore, extremely difficult to estimate at their true value accounts of fatalities wherein the personalities of both the patients and the administrators are unknown to us.

Nevertheless an indictment such as that drawn up by J. F. Baldwin[1] must cause us to weigh very carefully our own experiences and conclusions with regard to prolonged use of nitrous oxide. This lesson is emphasized by the fact that some of the cases were in the hands of acknowledged experts, and that so warm an advocate of nitrous oxide and oxygen as Gwathmey says with regard to a case of his own that the death "has changed my ideas of the safety of nitrous oxide entirely." This anæsthetist is quoted as saying that he "knows of from twenty to forty unreported deaths," and Teter, of Cleveland, writes that he knows of twenty-six similar fatalities. Of course the mere fact that there have been fatalities during the employment of a certain method goes for very little; we must know the nature of the operation performed, and the condition of the patient before it started, if we are to be able to assign any value at all to the part which the anæsthetic may have played in bringing about the catastrophe. Many deaths during anæsthesia can in no way be fairly considered as deaths due to the anæsthetic. In the cases reported by Baldwin, important details are so lacking in many of the instances that we are quite unconvinced as to the dangerous part played by the anæsthetic, for the operations were of a formidable nature and

the patients not apparently good subjects. In others, however, it is difficult to avoid the conclusion that the anæsthetic was the primary cause of the disaster. The deaths do not appear to have been in every case of an asphyxial nature, but due to sudden heart failure; and it is here, no doubt, that possible danger may arise, for nitrous oxide is capable of dilating the heart. However widely it may be used in other cases, it would seem certain that prolonged nitrous oxide and oxygen anæsthesia should be avoided in the cases of the very anæmic and the very obese. Post-mortem experience, as far as it is adduced by Baldwin, points to syncope unassociated with asphyxia as the usual mode of death. This author's concluding paragraph may be quoted: "Nitrous-oxide-oxygen has a field of usefulness to which it should be strictly limited. It can be used for very brief operations, as it has been for many years in the extraction of teeth. It is also probably the safest anæsthetic to use, as suggested by Ochsner, in cases of acute pulmonary congestion, or of acute nephritis. With these exceptions, which make its field a very limited one, nitrous-oxide-oxygen should be looked upon as the most dangerous anæsthetic that can be used, even in the hands of the most experienced."

To turn now to the favourable aspect of this method. When all goes well, and a formidable abdominal operation is carried out under nitrous-oxide-oxygen and local anæsthesia, the condition of the patient, at the close, and during the following days, is immeasurably superior to that commonly seen when a similar procedure has been undergone with the aid of ether or of chloroform, however administered. The absence of shock from the local nerve-blocking, the absence of nausea and of all toxic effects upon the liver and kidneys, and the ability of the patient to take any suitable form of nourishment by the mouth with pleasure, and to retain it, together render his condition so satisfactory that until it has been witnessed it might well be considered incredible by those who have only experience of patients during their recovery after the toxic anæsthetics. In consequence of this, operations may be undertaken upon patients who would be very bad risks, because of after-effects, if reliance were solely upon ether and chloroform. "To operate successfully under nitrous oxide demands a studied respect for all tissues at every stage. By this means unnecessary traumatism is avoided, the amount of post-operative wound repair lessened, and the vitality of the patient conserved." The writer of the above[2] considers that "nitrous oxide is as safe as ether, and when the possibility of post-operative complications attributable to the anæsthetic is included, more so"; he speaks on the basis of an experience of 300 major operations performed under nitrous oxide and oxygen. A recent correspondence[3] anent a death reported by McCardie has sought to apportion exactly the blame to be borne by nitrous oxide. Few will agree with the dictum of an eminent physician,[4] who has, on his own showing, no practical acquaintance with anæsthetic administration, that nitrous oxide and

oxygen should not be administered at all, no matter how experienced the anæsthetist. Many years of experience have placed this anæsthetic in the foremost place for safety, wherever it is a question of a short operation upon an individual in normal health ; to discard it because deaths have occurred during its use for long and formidable operations would be as foolish as it would be to banish opium from the pharmacopœia because persons have died of an over-dose.

Another use which has been made of nitrous oxide and oxygen of late is for the maintenance of *analgesia in labour*.[5] A record of 133 cases is furnished. Of these, 7 patients had inhaled the mixture for three hours, 1 for five, 1 for six, and 1 for seven hours. The remainder had it for periods varying from two to three hours. The results were satisfactory. A state of analgesia without abolition of consciousness is the anæsthetist's aim. No harmful effect upon the heart of mother or of fœtus was observed. The administration is begun at the end of the first stage, or earlier if the pains cause real suffering. A small nose-piece is used, and from four to eight breaths usually produce analgesia. The process is repeated as often as necessary to avoid pain, and during the passage of the head over the perineum it is generally necessary to produce anæsthesia, a mask covering both mouth and nose being employed for this purpose.

Twilight-Sleep in Labour[6] finds warm supporters. It is obtained by injections of scopolamine (gr. $\frac{1}{150}$) and morphia (gr. $\frac{1}{4}$). After the first injection, the obstetrician waits thirty to fifty minutes and then gives the second injection. This consists of gr. $\frac{1}{150}$ scopolamine alone, and is repeated according to the patient's requirements as determined by the tests for amnesia. The method is inapplicable unless the practitioner is prepared to stay by his patient from when he begins the injections to the end of labour, for the memory test is applied every ten or fifteen minutes. The author quoted writes : "Twilight-sleep is entirely safe in proper hands, but its general use is at present quite impossible."

Alkaloids in Conjunction with General or Local Anæsthesia has become a widely established custom. There remain still, however,[7] some who believe that the disadvantages of the practice outweigh its advantages. Thus, the danger of respiratory paralysis is much dreaded, and the loss of pupillary reaction is considered a very great defect of the method. It must be remembered, however, that the use of atropine alone cannot be objected to on either of these grounds, and has indubitable value when used in association with ether inhalation. The additional use of morphia and scopolamine is to be recommended particularly when spinal or local analgesics are relied upon. In all operations where there is a chance of blood or mucus accumulating in the air-passages, those alkaloids which prolong the insensibility of the larynx, as morphia and scopolamine, should certainly be avoided.

Warm Anæsthetic Vapours have been claimed to possess advantages.[8] It is contended that the inhalation of unwarmed vapour

reduces the body temperature to an extent which may lessen the patient's chances of recovery after formidable operations, and may increase the risk of pulmonary complications. A considerable amount of experimental work has been done to show both the actual lowering of the temperature of inhalations produced by 'open' unwarmed ether vapour, and the beneficial results of warming it as evinced by lessened amounts of anæsthetic required for given degrees of narcosis. Other experiments have shown that animals are killed much more quickly with chloroform at ordinary room temperature than with that which has been warmed. Against these findings must be placed those which show[9] that cold vapours, when inhaled, are about two degrees below body temperature by the time they reach the middle of the trachea, and are level with body temperature before they reach the alveoli of the lungs. As the writer points out, if there were not some efficient arrangement for the rapid warming of inhalations, warm-blooded animals could probably not exist in Arctic climes. It seems probable, after the examination of all the evidence, that warmed vapours have no particular advantage for ordinary routine work, but that in collapsed patients or during very long operations the method should be employed. Shipway[8] claims that with his apparatus all the advantages of open ether are preserved, and that there is economy of ether as well as "simplicity, free respiratory exchange, and equable dosage." The warm vapour he finds to be less irritating to inhale, and therefore to cause less secretion of mucus and saliva. Some observers have found difficulty in securing sufficiently deep narcosis in the case of robust subjects. In casualty clearing stations in France the method has met with much approval, and of course these places would provide just the cases of individuals depressed by loss of blood, shock, injury, and exposure, in whom every slight aid in the maintenance of body heat and energy is of value. Observations, both clinical and experimental, are still being made to determine exactly the value of warming anæsthetic vapours, and readers interested in this matter will find some good work related in the *Annals of Surgery*.[10]

Caudal Anæsthesia, i.e., anæsthesia produced by injecting into the sacral canal, is advocated for use in genito-urinary operations.[11] The process involved is similar to that which is familiar in the use of spinal analgesia, but the injection appears to be by no means easy to make with constant success. The authors write on a basis of eighty-five cases, and claim perfect safety, if not always perfect anæsthesia, as an inevitable feature of the method. The drugs employed were 1 per cent solution of novocain and 1 per cent solution of potassium sulphate, to which two drops of 1–1000 adrenalin are added for each 30 c.c. of the combined solutions. Insensibility is not tested for till fifteen minutes after injection.

Spinal Analgesia.—The fact that spinal analgesia is no contra-indication to the use of the Trendelenburg position has lately been pointed out,[12] and it has been clearly shown that the former fears of evil effects upon the medulla oblongata through the lowered position

of the head and neck are ill founded. Seventy cases, mostly of severe abdominal operations, are reported, and the results appear highly satisfactory. The authors recommend that enough general anæsthetic should be employed to ensure unconsciousness, continuous 'gas and oxygen' generally meeting the case. Novocain, 5 per cent solution with adrenalin, was the most generally used anæsthetic, and solutions to which glucose has been added are taboo. The patient is not put into the Trendelenburg position till fifteen to twenty minutes after injection.

Mortimer[13] recommends this combination of general and spinal anæsthesia for use in suprapubic prostatectomy, for which operation he has employed it successfully fifty-seven times. For this operation, prostatectomy, an elaborate combination of sacral anæsthesia with local analgesia by infiltrations of the prostatic capsule is described in detail and illustrated.[14] The suprapubic wound is made sometimes as a preliminary operation some days before the removal of the prostate is carried out. Sacral analgesia alone is declared to be too uncertain for it to be relied upon as the sole source of insensibility.

Oil-ether Colonic Anæsthesia.—Further attention has been devoted to the technique of this method, which is now claimed by some as the best of all in the surgery of the upper air-passages.[15] It is also warmly recommended in the case of the very obese, who are, of course, as a rule, awkward subjects for inhalation anæsthesia. More than a thousand cases have now been reported in America. Gwathmey asserts that when the whole quantity needed is put into the colon the absorption of ether proceeds at a constant rate of about two ounces per hour, and that this is a more economical method than any other except the intravenous. He believes that anæsthesia is maintained by the ether separating from the oil according to inflexible physical laws. The amount of this vaporization per minute does not vary: therefore it is impossible to have a deep narcosis at one time and a light one at another, unless anæsthesia is deepened by re-breathing or lightened by an air-way tube.

The rectal method has been used with success for thyroidectomy,[16] and the advantage of being able to induce unconsciousness whilst the patient is still in bed out of the operating theatre is valuable in these cases. Post-operative vomiting was present in less than 12 per cent of the cases. A preliminary injection is given, forty minutes before operation, of paraldehyde 2 dr., ether and olive oil of each ½ oz., morphia gr. ¼. Eight ounces of a 75 per cent mixture of ether and olive oil are regarded as the maximum dose to inject into an adult.

Ethyl Chloride is recommended as highly suitable for use in painful dressings which take several minutes, such as are so commonly required in the case of war wounds and fractures.[17] The method employed is very simple, and consists chiefly in covering the face with a gauze pad, enclosing this and the patient's head in a mask of impermeable material in which two holes corresponding with the nostrils serve to admit the nozzle of the tube from which ethyl chloride is liberated as

required. The amount of air admitted is limited, and complete return of consciousness is not permitted between the doses of ethyl chloride sprinkled in. Anæsthesia can be kept up even for an hour in this way.

References.—[1]*Med. Rec.* 1916, ii, 177 ; [2]*Jour. Amer. Med. Assoc.* 1916, i, 175 ; [3]*Brit. Med. Jour.* 1916, ii, 109, 160 ; [4]*Ibid*, 291, 339 ; [5]*Surg. Gyn. and Obst.* 1916, 354; [6]*Amer. Jour. Surg.* 1915, ii, 138 ; [7]*Ibid*, 141 ; [8]*Lancet*, 1916, i, 20 ; [9]*Jour. Amer. Med. Assoc.* 1916, i, 1376 ; [10]*Ann. Surg.* 1916, i, 305 ; [11]*Surg. Gyn. and Obst.* 1916, i, 262 ; [12]*Lancet*, 1916, i, 1, 1169 ; [13]*Ibid.* 1915, ii, 919 ; [14]*Jour. Amer. Med. Assoc.* 1916, i, 1363 ; [15]*Laryngoscope*, 1915, 699 ; [16]*N. Y. Med. Jour.* 1915, ii, 296 ; [17]*Presse Méd.* 1916, 45.

ANEURYSM. *W. I. de C. Wheeler, F.R.C.S.I.*

Arteriovenous aneurysm has occurred in a great number of cases, as a result of wounds to the blood-vessels, in the present war. Grey Turner[1] deals with a long series of cases of traumatic aneurysm, which furnish a striking commentary on the ravages produced by modern weapons. Godwin[2] describes a case of arteriovenous aneurysm of popliteal vessels successfully treated by end-to-end anastomosis of the veins and suture of the artery.

Rutherford Morison[3] points out that there is a tendency for missiles to push aside important structures like blood-vessels and nerves, and do no material damage. This could only occur if the vessels and nerves were mobile. "The escape of an artery from a bullet is due to its elasticity and mobility. At points where branches arise the artery is tethered by them, so that it becomes fixed, and is pierced by the impact of the bullet, and the branches are either torn through or caught and divided. The lesson is clear. Control of the artery above and below will not suffice. It is necessary to command the entire circulation of the limb before the aneurysm is opened in these cases." In an illustrative case of arteriovenous aneurysm in Scarpa's triangle, Morison describes an operation where the intention was to clamp the common femoral artery above, the superficial femoral below, to empty the aneurysm, expose the holes in the artery and vein, and close each by suture. This was found impossible at the actual operation, and in consequence both artery and vein were ligatured above and below. There was never any sign of circulatory difficulty in the leg after the operation, and when the patient left hospital there was a strong pulse in both tibial arteries.

The present writer has had a similar experience in two cases. The femoral artery and vein were ligatured for arteriovenous aneurysm in an officer wounded a month previously, and also in a case of a child, age 8, who developed a diffuse traumatic aneurysm in the thigh, the result of injury to the artery and vein, received in the street fighting during the Sinn Fein Rebellion. The operation was performed about one month after the injury. From a large number of cases reported it would seem that there is no extra risk, so far as the circulation of the limb is concerned, in tying the femoral vein at the same time as the artery is ligatured. When there is a substantial interval between the date of the injury and the date of operation, the collateral circula-

tion is sufficiently established to ensure the circulation in the limb after ligature of the vessels at the site of the injury.

Greaves[4] describes four cases of arteriovenous aneurysm, and one case of traumatic aneurysm of the popliteal artery.

McAdam Eccles[5] lays down some general rules with regard to the treatment of traumatic aneurysms: (1) Operation should be postponed until it becomes absolutely necessary; this allows collateral circulation to be established, and the likelihood of gangrene is much diminished; (2) The operator should be prepared for violent hæmorrhage, unless it is possible to apply a tourniquet on the proximal side of the aneurysm; (3) There should be abundance of room for operation through a long incision. The operation will consist either of ligation of the vessels, operation on the sac, or amputation. Proximal ligation of the vessel is not recommended. It is necessary also to tie the vessel below, and in some cases to excise the sac. Opening of the sac, and closure of the mouths of the vessels feeding it, is an ideal method of treatment, especially if the sac is excised or obliterated by suture. It is often not an easy operation, and entails a good deal of disturbance if the wound is septic. Eccles thinks that an arteriovenous aneurysm is best treated by a ligature of both vessels, on both sides of the communication between the artery and vein, with excision of the sac if there be one.

H. von Haberer[6] extols the use of suture, and prefers it to ligature in cases of aneurysm. Burnheim[7] gives an excellent description of the 'ideal' operation for aneurysms of the extremity, and reports a case.

Aneurysm of the Innominate Artery.—Thompson[8] remarks that for the treatment of 'intrascalene' aneurysms, ligature of the innominate, with or without simultaneous ligature of the carotid, is usually the only procedure open to us. Since 1880 the innominate has been tied twenty-six times for aneurysm of the subclavian artery, with twelve recoveries and fourteen deaths. Thompson ligatured the artery in a case of huge subclavian and auxiliary aneurysm under local anæsthesia. Nearly a month after operation there was no sign of pulsation in the sac, but a soft tumour had developed in the floor of the axilla, which was found on aspiration to contain pus. Three weeks later there was a profuse hæmorrhage from the walls of the abscess cavity. This was stopped by packing. Without further hæmorrhage the patient died suddenly two months after the original operation.

References.—[1]*Brit. Jour. Surg.* 1915, Oct., 282; [2]*Brit. Med. Jour.* 1915, ii, 925; [3]*Brit. Jour. Surg.* 1915, Oct., 280; [4]*Brit. Med. Jour.* 1915, ii, 924; [5]*Clin. Jour.* 1916, 3; [6]*Wien klin Woch.* 1915, xxvii (quoted in *Surg. Gyn. and Obst.* 1915, ii, 411); [7]*Johns Hop. Hosp. Bull.* 1916, April, 93; [8]*Ann. Surg.* 1915, i, 641.

ANGINA PECTORIS.

Carey Coombs, M.D., M.R.C.P.

Papers by Bramwell[1] and Neuhof[2] serve to remind us that discussion of the etiology of cardiac pain has an interest for the practical clinician as well as for the pathologist. The former insists on what

he has already taught, namely, the origin of angina pectoris in irritation of the cardiac nerves by overstrain of the left ventricle. The link between these two processes—overstrain and irritation—is not clearly defined. It may be that overstrained muscle fibres crush afferent nerves, or that some katabolite, formed in excess during effort in a diseased myocardium, acts as a chemical irritant. His chief point, however, is one of direct clinical interest. After reminding us that the direction in which severe cardiac pain most often radiates is into the left arm, he quotes a number of cases, tabulated from his own experience, to prove that when the pain darts into the right arm only, or into both arms, it is a sign of disease at the root of the aortic arch—syphilitic aortitis, with or without aneurysm, atheroma, and so on. Sometimes, he thinks, right-sided pain may originate in the wall of the right ventricle, much as the more frequently encountered left-arm pain is associated with disease or overstrain of the left ventricle ; but this he regards as less probable than the aortic hypothesis.

Whether Bramwell is justified in his conclusion as to the significance of bilateral or right-arm pain in heart disease or not, certain it is that the most striking manifestations of cardiac pain are especially associated with disease at the root of the aorta. Neuhof reminds us, however, that this association is not invariable. Cardiac pain of all grades of intensity, from angina downwards, may be a symptom of almost any disease that injures the myocardium ; for instance, of rheumatic heart disease, in which the root of the aorta usually escapes serious damage. Not only so, but anginal pain is often associated with conditions, such as tobacco excess, in which it is unlikely that there is any gross cardiac lesion at all.

Treatment.—As Babcock[3] reminds us, angina must be regarded as a symptom, not as a disease. To relieve the pain is not enough. The underlying disease must be treated. Both he and Neuhof agree in condemning the indiscriminate prescribing of **Nitrites**. They regard the continuous administration of these remedies as bad practice, reserving them for immediate relief of pain and not expecting of them any preventive action. If the pain prove intractable, **Morphine** should be given. In cases where the other symptoms seem to indicate it, **Digitalis** and other cardiac tonics may be given. Pain constitutes no contra-indication to their use. Both recommend **Theobromine Sodium Salicylate** in doses of from 5 to 10 gr. three times daily, especially in the type of case most often associated with angina—cardiosclerosis with or without high arterial tension. Babcock finds that it rarely disturbs the stomach if given in capsules with taka-diastase or pancreatin. He also lays stress on the value of **Medical Gymnastics**—" active exercises under the supervision and control of someone skilled in their use." **Hydrotherapy**, in the form of " salt rubs" and Nauheim baths, also affords relief by inducing peripheral vasodilatation. **Iodides** should be given if a syphilitic factor be suspected, but even in such cases Babcock thinks their results dis-

appointing. Neuhof finds the **Karell Diet** valuable in the commonest class of anginal case, myofibrosis cardis with hypertension. It consists of 1000 c.c. of milk daily, given in cupfuls, sipped slowly, at three-hour intervals. Apples, oranges, and an occasional piece of toast may be added if the patient feels very hungry. This diet may be applied continuously or at intervals, according to the severity of the case. Where a definite etiology can be established (rheumatic infection, syphilis, tobacco), treatment must of course be designed to meet it.

Soca[4] follows the writers already quoted in condemning the continuous use of nitrites. Indeed, he claims that his detoxicating plan of treatment, applied to the hypertensive type of case, enables him to dispense with them almost entirely. The principles of this treatment are diet, diuretics, and rest. For the first day the patient is given nothing but water. On the second day milk is given in quantities varying from 1½ to 3 quarts. Nothing but milk is allowed for from one to three weeks, according to the severity of the case and the response to treatment. In the milder cases, at the end of a week, soups made of milk and various kinds of cereals are added and continued for one or two weeks. At the end of this time cooked vegetables without salt are added and continued for a month or two. Then eggs and a small amount of meat are allowed. Milk still remains the basis of the diet, and no salt is added to the food. This remains the permanent diet, except that it is discontinued for one week each month, during which time milk alone is taken. If attacks recur, the milk diet is resumed at once. Some diuretic is always given, such as theobromine salt. Absolute rest is not found to be necessary in any but the severest cases. Moderate exercise, including walking, is allowed, but insistence is laid on the avoidance of hasty exertion.

Anginal attacks can be cut short, according to Constable,[5] by a novel method which he has devised. He describes its application as follows: "Early in December of 1915 I called on X after some weeks, and found him in much pain in both arms and chest. At once I got him to grasp the top bar of the bed with both hands, letting most of his weight fall on the now strongly stretched arms for some forty seconds. After a short rest he repeated the process some five or six times. Result: Immediate cessation of all pain in arms and some relief of the chest. I now got him on the floor to grasp the bar at the end of the bed with both hands behind his back, bending forward at an angle of about 60°, the chest thrown forward, and the head back, thus subjecting the muscles of the affected area to strong tension. This he repeated some half-dozen times, each lasting about forty or fifty seconds. Result: Immediate cessation of all pains in the chest, the sense of constriction completely vanishing. He now went to his bath, and for the first time the exertion of washing caused only the merest suspicion of the old ominous forebodings of ill. For some weeks the process was continued about every two hours, the minor

pains occurring with less severity and frequency; and it is important to note *that on no occasion did the stretching fail to give immediate relief*, though the operation must have been performed hundreds of times. No medicine was taken. X is now at work and able to walk with almost his old rapidity." Constable ascribes the efficacy of this method to mechanical stretching open of peripheral vessels.

REFERENCES.—[1]*Edin. Med. Jour.* 1915, ii, 388; [2]*Jour. Amer. Med. Assoc.* 1916, i, 723; [3]*N.Y. Med. Jour.* 1916, ii, 898; [4]*Jour. Amer. Med. Assoc.* 1915, ii, 2166; [5]*Lancet*, 1916, i, 934.

ANKYLOSTOMIASIS. *Sir Leonard Rogers, M.D., F.R.C.P.*

G. Duncan Whyte[1] writes on the simplified diagnosis and treatment. After pointing out the time and labour involved in searching for the ova in stools, especially to determine if a patient is cured, he describes his procedure based on the fact that a trace of blood is constantly present in the fæces of ankylostomiasis patients, and that a watery extract of a stool will reveal blood in a dilution of 1–800,000 by the following well-known test, with which half a dozen specimens can be examined in ten minutes. The reagent is prepared by treating 100 c.c. of a 20 per cent solution of caustic soda with 2 grms. of phenolphthalein and 10 grms. of zinc dust. The rose-coloured solution is heated gradually until it has assumed a slightly yellow colour. The supernatant fluid is poured off into a coloured glass bottle, and the access of air prevented by adding a little liquid paraffin to its surface. Two c.c. of a watery solution of the fæces is added to 1 c.c. of the alkaline solution of phenolphthalein, and then one drop of hydrogen peroxide. In the presence of blood a bright red colour appears. The patients should not have eaten meat or blood during the previous seventy-two hours, and other causes of blood should be excluded. In cases of suspected ankylostomiasis, one slide is examined for ova, and if not found, the patient is told to exclude meat from his diet and bring a stool in three days for the blood test. In the treatment, he receives at 7 p.m. calomel gr. 3, phenolphthalein gr. 2, and santonin gr. 4. The following morning he is given, without food, beta-naphthol gr. 40 at 6 and 8 a.m., and thymol gr. 30 at 10 a.m. in capsules. At noon magnesium sulphate, which is repeated at 3 p.m. if the bowels have not acted. Ten days later the stools are tested for blood; the treatment repeated if it is found, and so on until blood is absent.

REFERENCE.—[1]*Ann. Trop. Med. and Par.* 1916, April, 79.

APPENDIX VERMIFORMIS, SURGERY OF.

E. Wyllys Andrews, M.D., F.A.C.S. (Chicago).

Moschcowitz, of New York, discusses the pathological diagnosis of 1500 specimens of diseased appendix. The previous work of Aschoff is not altogether corroborated in this writer's experience. He also criticizes the confused terminology of this disease, and the looseness with which the words catarrhal, gangrenous, ulcerative, and perforated appendicitis are employed. Consequently, the pathology of appendi-

citis remains very indefinite from the average surgeon's view-point. In examining the diseased organ, he holds that the longitudinal slitting of the tube is wrong. Strictures are overlooked because the trauma destroys the lumen. He recommends simple transverse incisions at different levels, enabling us to tell the topography of the exudate and the width of the lumen.

Suzuki, of the Japanese Navy, discusses the rôle of *Oxyuris vermicularis* in the etiology of appendicitis. As has been noted by Aschoff, who reports six cases of oxyures in the appendix, these parasites are apt to cause deep fissures or ulcerations, sometimes with branches in the musculature inside the lumen of the appendix. N. Sagredo has recently examined 100 appendices after operation, finding 51 cases containing the parasites or their eggs. Only 6 of these showed important pathological changes. On the other hand, cases having very intense inflammation rarely show the presence of the parasite. Hueck found the worm in 14 out of 78 cases. Suzuki examined 500 cadavers, finding the oxyures in 44 cases, 29 times in the cæcum and appendix, 6 times in the cæcum alone, and 9 times in the appendix alone. All authors agree that this is more common in children than adults. The writer then reports certain experiments to elucidate this problem. Two dogs were fed by the mouth with a number of oxyures, the object being to ascertain whether or not they would localize in the appendix. In neither of these animals did this occur. The location of the parasite was either in the lumen or submucous space. In an absolutely normal appendix the oxyures usually bore actively through the mucosa as far as the submucosa, but seldom is there penetration of the musculature. Four cases are included in this report, all of them diseased appendices removed at operation showing the presence of oxyuris.

Pfeiffer, of Philadelphia, discusses *appendicular obliteration* during the course of chronic appendicitis. His conclusions, based upon one hundred consecutive cases of appendicular obliteration operated upon by J. B. Deaver, are: (1) Appendicular sclerosis and its terminal stage, appendicular obliteration, differ pathologically and clinically from chronic active appendicitis. (2) Three types of symptoms are to be considered: (*a*) Reflex, due to irritation of the nervous mechanism of the appendix; (*b*) Local, due to mesenteric and peritoneal contractions and inflammatory bands or adhesions affecting the appendix, cæcum, ileum, or ascending colon; (*c*) Consecutive symptoms, general and local, consequent upon disturbed function of the ileocæcal region. (3) Simple appendectomy avails for reflex symptoms, but in local and consecutive symptoms only in so far as the operation permanently frees symptom-producing contractions, sclerosis, or adhesions. (4) The determination of these latter conditions and the appropriate treatment therefore awaits further observations and experience.

Fowler presents a collective review of anatomy and pathology of the appendix illustrating several interesting points. Recent embryological studies, he states, have demonstrated that various malpositions of

the appendix are dependent upon non-rotation of the gut. Corner is quoted as stating that in children it is common to find that the cæcum has not reached the iliac fossa, but has been delayed in descent, remaining in the umbilical region. In the physiology it is to be noted that the musculature of the appendicular region acts with that of the appendix to insure peristalsis. The walls of the appendix secrete lytic and amylolytic ferments. There is also an internal secretion of hormones which stimulates peristalsis when injected into rabbits. It is to be concluded that the appendix is a specialized part of the cæcum with a definite peristaltic and sphincteric action. As to the etiology, it is the conclusion of Rosenow that appendix disease is usually caused by streptococci, that these bacteria are located in some distant focus of infection, and that they acquire an elective affinity for the appendix, so that upon entrance to the blood-stream they are carried to that organ. The finding and removal of such focal infection is an important measure in the prophylaxis. The association of appendicitis and throat infection is thus explained. Alderson also notes the relation between appendicitis and tonsillitis, reporting a number of cases of acute tonsillitis quickly followed by abdominal symptoms, in each of which a gangrenous appendix was found at operation. Savini is convinced that minute traumatic lesions of the appendix mucosa are very frequent. Hughes believes that the initial cause of appendicitis is mechanical—rotation of the appendix around its mesentery, the degree of the rotation determining the severity of the attack.

Judd reports a case of '*autotransplantation*' of the appendix, a term used by Murphy. During an operation on the kidney it was found united to the cæcum by only fine adhesions, and without any connection with its lumen.

Diagnosis.—Ten Horn reports that traction upon the right cord produces pain in appendicitis. This occurred in twelve out of fifteen cases. Ruthkevitch states that chronic appendicitis is frequently diagnosed as gastric disorder. **Palpation** is the best way to localize the inflamed point. In some cases palpation may even cause pain at remote points. *X*-ray diagnosis of appendicitis is by no means a sure measure. Barium or bismuth does not always enter freely into the lumen. Inability to demonstrate the appendix by the Röntgen ray may be due to obliterating appendicitis or swelling of the tissues, kinking or adhesions near the base, or the organ may lie behind or in line with the cæcum so as not to be seen separately. Nevertheless, when the appendix remains filled longer than the cæcum we can demonstrate it. Perhaps not more than once in fifty times is this possible. It is usually necessary to use the fluoroscope rather than the *x*-ray plate, and to manipulate the abdomen with both hands. Pfahler states that inability to demonstrate the appendix by *x* rays may mean that it has been obliterated. (*See also p.* 40.)

Morley calls attention to errors in diagnosis, especially in cases in which there has never been an acute attack. He considers Lane's kink to be symptomless, and also Jackson's pericolic membrane.

Treatment.—Syms reports a mortality of 100 per cent in a series of cases of appendical origin in 1904. In a later series the mortality was 16 per cent. He does not agree with Stanton that peritoneal infection can be prevented by withholding food and complete rest, but advises immediate operation at any stage of the disease. As opposed to this, Hicks advocates the use of the **Ochsner Method** from about the third to the tenth day of the disease. This consists in the prohibition of food, laxatives, and even water, with complete rest in bed and rectal saline. All cases seen in the first two days should be operated upon at once, but cases from the fourth to the ninth day are treated medically until a safer time for operation.

The question of the incision for removing the appendix is discussed by Brickner, who praises the gridiron or buttonhole incision of McBurney for simple cases. This does not lend itself so well for rapid enlargement if more room is required. Rockey employs a transverse incision with its centre near McBurney's point, the outer part of the rectal sheath being divided and the muscle drawn inward. Cullen's method of exposing the appendix during operation consists in drawing a tape through its mesentery with blunt forceps. Traction upon this tape brings up most of the appendix. One or more insertions at deeper points will enable the operator completely to mobilize the appendix tube. Benjamin objects to the rather common practice of leaving the raw appendix stump uncovered, on account of the danger of adhesions.

Complications of appendicitis include abscesses, both in the upper and lower parts of the abdomen. Delatour reports seven cases of *pelvic abscesses* following Fowler's position. These are best treated in his experience by rectal incision, as they are also best diagnosed by rectal examination. At the upper end of the abdomen a like condition in the form of subphrenic abscess is known to be very common. This must be operated upon early, draining to the right or left side, usually between the liver and diaphragm, or the fissures of the liver. Babler finds that *pylephlebitis* following appendicitis causes multiple abscesses of the liver or lung. Two cases in the liver and one in the lung are reported by this writer, all of which were fatal.

As to operating for the disease during *pregnancy*, Deaver claims that the earlier the operation the less the likelihood of infection of the tube and ovary. Markoe believes that abortion can be avoided by a minimum handling of the uterus and adnexa. Wallace reports a case of ruptured appendix at full term pregnancy the day before a normal delivery, with the recovery of both the mother and child.

The mortality of appendicitis should be less than 5 per cent according to Turner, and be less than 1 per cent if all operations were early. Murphy states that the mortality in hospitals in the United States is 10 per cent, the high rate being due to procrastination.

Fowler's conclusions are: (1) The incidence of primary carcinoma of the appendix suggests the advisability of routine appendectomy during laparotomy; (2) Infection of appendix by bacteria carried

through the blood-stream from a distant focus is an established fact ; (3) Typhoid fever and pneumonia, in their early stages, may be difficult to differentiate from acute appendicitis ; (4) The chief symptoms of chronic appendicitis may be referred to the epigastrium ; (5) Undue retention of barium in the appendix and tenderness of that organ elicited under visualized palpation are Röntgen signs of great diagnostic value.

References.—*Ann. Surg.* 1916, i, 694 ; *Surg. Gyn. and Obst.*, 1916, ii 1 ; *Brit. Jour. Child. Dis.* 1913, x, 296.

ARNETH'S COUNT. (*See* Diphtheria.)

ARTERIAL PRESSURE, HIGH. *Carey Coombs, M.D., M.R.C.P.*

Etiology.—Willson[1] describes certain rather vague observations on himself, on his patients, and on animals, which lead him to believe that systematic overloading of the alimentary canal with all kinds of food, from babyhood onwards, is mainly responsible for high arterial pressure and consequent cardiovascular disease. His argument is that the stagnant food undergoes decomposition, which furnishes the system with poison, favours general infection by *B. coli*, and embarrasses the heart by lifting the diaphragm. He is thus led to the belief—already expressed so powerfully by the late Professor Metchnikoff—that the premature old age of high tension is preventable. In particular he blames protein excess as yielding amino bodies which have been shown to be toxic for the arteries.

Observations, made on a series of French militiamen by Lian,[2] go to prove that alcoholic excess is, after all, an important factor in the production of arterial hypertension. Among heavy drinkers he found a far greater percentage with high pressure than he did among those whose habits in this respect were sober.

Diagnosis.—Phipps[3] records a series of data from blood-pressure readings, as to the variations which are dependent on the patient's posture, the artery examined, the method used (whether palpatory or auscultatory) and so on. His conclusions practically consist of a series of contradictions of the results of other workers. They do, however, point to this, which will be corroborated by all but the wild enthusiasts, that the accuracy of sphygmomanometry, whatever the method used, is only relative, and that it is therefore a mistake to make much of small variations, e.g., a difference of 10 mm. between the two brachial arteries. It is so impossible to cut out factors of variability, such as emotion, influence of posture, and the like, in making comparative observations, that small fluctuations are quite overlapped by an inevitable margin of error. It is true that, as Mackenzie's[4] useful paper points out, diastolic pressure measurements do to some extent eliminate certain factors of error and thus render comparative observations more valuable. He supports his argument by tables of large numbers of blood-pressure estimations, by various examiners, in connection with life insurance.

Treatment.—Grossman[5] is impressed by the value of **Muscular Relaxation** as a means of treating high blood-pressure. He selects

five cases of organic cardiorenal disease to illustrate his thesis, remarking that this method removes much of the danger of such lesions, although it is, of course, powerless to cure them. Bodily rest in the recumbent posture lowers blood-pressure by slowing the heart and inducing vasodilatation. Mental rest has a similar effect, emotion and excitement conversely raising pressure. The 'exercises' which he recommends are based on these facts. They are described as follows: "The exercises are divided into two parts, (1) breathing, (2) relaxation. A quiet room, preferably darkened, a bed or couch wide enough to keep the patient's arms from hanging over the side when they are relaxed, and a small cushion for the patient's head are all the equipment necessary. The bed should be quite high, so that the operator can manipulate the muscles comfortably. (1) *Breathing exercises.* The patient is placed in a recumbent position: the clothes about the chest and abdomen are loosened. He is then directed to inspire deeply, using his diaphragm and restricting his thoracic movements; at the height of inspiration he is asked to pause, then slowly and evenly to expire to the fullest extent, and again pause. His mind should be free from any distracting influences, and his attention must be kept on the sensation of the current of air passing through his nasal cavities. A small sand-bag or weight placed upon the abdomen will help to fix his attention on the exercise. After six or eight deep breaths have been taken, the patient is asked to take about the same number not quite so deep, and to shorten the pause at both inspiration and expiration; after this medium breathing is mastered, the depth of respirations is further decreased and the pause shortened, until the patient is breathing quietly and regularly, as if asleep. (2) *Relaxation exercises.* To relax the muscles, passive movements, in which the muscles are alternately lengthened and shortened, are employed. The muscles of the scalp, forehead, eyelids, cheek, and jaw are first passively moved until wrinkling and blinking of the eyelids diminishes and disappears, and a muscular spasm is reduced or eliminated. Next a shoulder, then the arm on the same side is relaxed; each in turn must be passively moved until all traces of muscular tension vanish and the part lies motionless and flaccid and falls limply from any unsupported position. After a part is relaxed, those previously and that newly relaxed should be briefly dealt with again, in the order in which they were first relaxed. This linking of parts previously to parts newly relaxed is helpful in bringing the whole to a satisfactory state of relaxation. The lower extremity on the same side is next dealt with. The trunk may be relaxed, at first with the patient sitting in a chair, and the muscles being moved from side to side." The patient is thus provided with an ever-ready means of treatment, which he can to some extent carry out for himself. But the chief advantage claimed for this method, as compared with treatment by drugs and other means, is the durability of the results.

References.—[1]*Jour. Amer. Med. Assoc.* 1915, ii, 1077; [2]*N.Y. Med. Jour.* 1916, i, 183; [3]*Boston Med. and Surg. Jour.* 1915, ii, 476; [4]*Med. Rec.* 1915, ii, 1033; [5]*N.Y. Med. Jour.* 1915, ii, 645.

ARTERIES, DISEASES OF. *Carey Coombs, M.D., M.R.C.P.*

That diffuse arterial degeneration may occur in comparatively young persons is remarked upon by Nammack,[1] in a general article on arteriosclerosis. In such cases a syphilitic taint may be suspected and inquired for, and suitable treatment instituted. Sometimes the syphilitic process so damages an artery as to lay the foundation of an aneurysm, even in childhood, as Chapman[2] reminds us.

An even more striking form of arterial disease of the presenile decades is that described by Parkes Weber[3] under the name proposed for it by Leo Buerger, namely, *thrombo-angiitis obliterans*. Its exciting cause is unknown. It is not syphilitic. Possibly tobacco intoxication has something to do with it. The great majority of the patients are Jew immigrants from the Slavonic countries, men between thirty and fifty. The characteristic symptoms are: (1) Redness or cyanosis of the foot when it is allowed to rest in a dependent position; (2) Pallor of the foot on movement at the ankle-joint; (3) 'Intermittent claudication,' with feeling of cramp or pain in the muscles of the leg after a few minutes' walk; (4) Absence of pulsation in the arteries of the foot. These features are the outcome of a gradually increasing obstruction of the arteries of the lower limb, due to endarterial inflammation followed by thrombosis, extending from the periphery gradually in the cardiac direction. Often it is accompanied or followed by thrombosis of the veins of the affected limb, also by 'ischæmic' ulcerations. These, together with the pain, which may rise to an intolerable pitch, call for **Amputation** sometimes. It is better not to amputate at a very high level: secondary operations may be necessary. Otherwise treatment consists of rest in bed: induction of **Passive Hyperæmia** by negative pressure, artificial warmth, etc.; and prolonged courses of **Iodipin.** For the ulcers Weber uses **Xeroform, Calcium Iodide** ointment (5 per cent), **Scharlach R.** ointment (8 per cent), and **Balsam of Peru** with a little **Silver Nitrate.**

References.—[1]*Med. Rec.* 1916, i. 682; [2]*Brit. Jour. Child. Dis.* 1916, 97; [3]*Quart. Jour. Med.* 1916, July, 289.

ARTHRITIS. (*See also* Joints, Surgery of.)

W. I. de C. Wheeler, F.R.C.S.I.

From a surgical point of view there are three types of arthritis. In the first type the osteophytes are separated from the old bone by a well-marked line of demarcation, just as is found in an exostosis in connection with bunion. This variety is often monarticular, and found in young people. Removal of the osteophytes gives excellent results.[1] (*Plates VII, VIII*). In the second variety, ossification appears to occur in the capsule and ligaments of the joint, and the new and the old bone are continuous. This condition is more often found in elderly people, and operation is more likely to be followed by ankylosis. This is not an undesirable result if pain is the predominant symptom. The particular joint and the occupation

of the patient must be considered when determining what result is desirable. In the third class of cases no osteophytes are formed, but there is a gradual painful destruction of the joint surfaces. This variety is usually polyarticular, and is very crippling in young subjects. The writer has obtained striking results in two instances by removal of a static colon. In all cases where the focus is apparent, **Vaccine Therapy** should be employed. Miller and Lusk have used injections of **Foreign Protein** (*pp.* 24, 25.) The operation of removal of osteophytes is referred to by Sampson Handley under the term 'cheilotomy.'

Brackett and Marshall[2] refer to operations on hip-joints for hypertrophic arthritis. They report 9 cases—in 1 the head was excised, in 3 the operation of cheilotomy was performed, in 4 arthrodesis, and in 1 arthrotomy for a loose body. The choice of operation should be made with great care. None of the patients were made worse by surgical interference. Surgery does not remove the tendency to continued overgrowth if the source of infection in the multiple arthritis cases is not removed. There is much less tendency towards recurrence in monarticular traumatic cases.

Little[3] draws attention to a group of cases, which are usually put down to tuberculosis of the hip-joint, but in reality belong to another class of arthritis, which were described by Calvé in 1910 under the term 'pseudo-coxalgia.' Little points out that flexion and extension of the thigh on the pelvis are free in a child suffering from this disease, but the other movements are greatly impeded. [Free movement in any direction is a valuable sign in differential diagnosis, because when the cavity of a joint is the seat of tuberculous or other inflammatory condition the movements will be impeded in every direction.—W. I. de C. W.] Little states that there may be some shortening, but no swelling or tenderness about the hip-joint. The Trendelenburg sign is usually found as in the congenital dislocation of the hip. The real features of the disease are only seen by *x* rays, "unless the practice of a German surgeon is emulated and the joint excised in order to obtain an interesting specimen." Little describes the treatment as follows :—

"Most surgeons who have dealt with this malady advise that no treatment should be adopted, and that the patient should be allowed to go about as usual without any mechanical appliance. It appears to the writer, however, that it is at least desirable to attempt to abduct the thigh, and keep it in marked abduction, so that the head of the femur may not take a form, as growth proceeds, which would prevent this movement, when the active disorder is at an end. For this reason it seems advisable, as soon as the nature of the trouble is ascertained, to abduct the thigh under anæsthesia and to fix it in that position by means of plaster-of-Paris or an abduction splint. With a patten or high boot on the other foot, the child is to be allowed and encouraged to move about freely. Fresh air and sunshine are no doubt desirable, as they are for all children, but no drugs are

PLATE VII.

CHEILOTOMY FOR ARTHRITIS OF HIP-JOINT

Fig. A.—Patient, age 21, October, 1912, before operation. A ring of new bone surrounded the junction of the head and neck of the femur. Great pain accompanied any movement of the joint. Crutches were used for seven years. (*Wheeler.*)

Fig. B.—Patient, age 21, three years after operation. Patient fourteen days after operation was walking with no pain and without crutches. Full movements were restored to the joint. There is no sign of recurrence. (*Wheeler.*)

PLATE VIII.

CHEILOTOMY FOR ARTHRITIS OF HIP-JOINT—*continued*

Fig. C.—Patient age 60—a recent case. Osteophytes in elderly people have usually no line of cleavage. Removal from the fixed acetabulum is more difficult than from the femur, which can be rotated during operation. (*Wheeler.*)

indicated, unless it be thought worth while to try the effect of thyroid feeding." (*Fig.* 12.)

Pseudo-coxalgia, as described above, appears to be one and the same disease as described by Perthes as a juvenile deforming osteochondritis. It is a progressive destruction, and, crushing principally in the upper femoral epiphysis, is characterized by a slight limp, mild subjective symptoms, a fairly constant limitation of abduction, and a benign course with complete recovery under little or no treatment. MeChesney[4] states that the disease is not associated with trauma—the children are affected in the second five years of life, usually boys. Pain is almost a negligible factor. There is delay in the ossification of the cartilage of the epiphysis, and to a less extent in the juxta-epiphyseal cartilage of the neck and isolated areas in the acetabulum: this forms what Perthes calls 'cartilaginous isles' or defects in ossification. As a result, we have flattening or crushing of the epiphysis, because cartilage persists in places where bone is needed to bear the increasing weight of the growing child and withstand the traumatisms of a boy's rough play. Later, the flattened epiphysis breaks into two or three pieces, and finally unites to the neck, which has become much shorter and thicker than normal, although still preserving the normal angle.

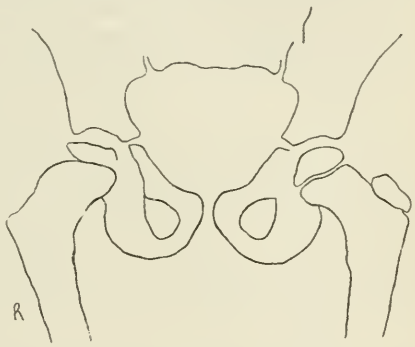


Fig. 12.—Pseudo-coxalgia. Outline of *x*-ray plate, in showing characteristic flattening of the bony head of the femur.
(*From the 'Clinical Journal'*)

All septic infections of joints not the result of trauma may be regarded as metastatic; the most familiar example is that produced by the gonococcus from eighteen to twenty-one days after the primary infection. The treatment of septic joints by drainage has been abandoned unless in extreme cases, and the Murphy method of heavy weight extension, repeated aspiration, and the injection of 2 per cent glycerin and formalin has been substituted. Excellent results with complete restoration of mobility have followed this line of treatment; but there is a tendency to go further along conservative operative treatment, and it is now well established that a septic joint may be opened, irrigated, and closed without drainage, with most gratifying results.

Cotton[5] believes that it is our duty either to declare a joint infection hopeless and then to lay the joint wide open (not drain it), or else to bend all our efforts to an optimistic attempt to save the joint. He treats septic joints by opening them—then irrigation is carried out for fifteen minutes, with a full stream of 1–15,000 corrosive

sublimate (the best way is to distend the joint, then let it collapse and empty, then distend again). The joint is afterwards flushed out with salt solution, and then closed in a thorough and watertight fashion. The external wound is left wide open or nearly so. There may or may not be an infusion in the joint; if it arises, it goes again within two or three days, and is not accompanied by temperature. This paper gives details of seven pus joints treated after this fashion, with almost perfect results. The treatment, however, seems inapplicable to such closed joints as the hip, shoulder, and ankle, and the Murphy method should be resorted to. Cotton's results are borne out by the experience of the treatment of certain gunshot wounds. For example, notwithstanding sepsis, free excision of the wound, including portions of the capsule and synovial membrane, followed by irrigation and closure, has been followed in many instances by restoration of the joint functions.

A. L. Loekwood[6] arrives at the following conclusions from a study of gunshot injuries of the knee-joint: (1) That all foreign bodies, whether metal or loose bone, should be removed from the knee-joint at the earliest possible moment; (2) Perfect immobilization is absolutely necessary. Do not start passive movements too early; wait at least three weeks after the inflammation has subsided; (3) Absolutely complete excision of all necrotic or even œdematous tissue; (4) The capsule should be closed at the first operation if at all possible; (5) Antiseptics, other than glycerin-formaldehyde, ether-iodoform, or saline, should not be introdueed into a joint; (6) Tubes should never traverse the joint surface as in Barnard's method; (7) Patients should not be moved till one is satisfied that infection has been successfully combated.

Keller[7] attaches great importance to the examination of the fæces in cases of tuberculosis of the joints. Patients keep on discharging tubercle bacilli for years so long as the disease is active. These bacilli are alive and capable of producing tuberculosis in others. In obscure cases the finding of the tubercle bacilli in the fæces is of great diagnostic value and should never be neglected. The smegma bacillus is absent in fæces. Keller concludes that the fæces of tuberculous patients must be regarded as a source of contagion and must always be thoroughly disinfected, and in a general way the same precautions should be observed as in a case of typhoid fever.

References.—[1]Wheeler, *Brit. Med. Jour.* 1913, i, 989; [2]*Boston Med. and Surg. Jour.* 1915, ii, 688; [3]*Clin. Jour.* 1915, Nov., 361; [4]*Jour. Amer. Med. Assoc.* 1915, ii, 1637; [5]*Boston Med. and Surg. Jour.* 1915, ii, 905; [6]*Brit. Med. Jour.* 1916, i, 153; [7]*Med. Rec.* 1915, ii, 864.

ASCITES, OPERATIVE TREATMENT OF.

E. Wyllys Andrews, M.D., F.A.C.S. (Chicago).

E. Jeger[1] discusses the treatment of ascites in cirrhosis of the liver by his method of lateral anastomosis of the blood-vessels. This operation, first proposed by him in 1912, was actually performed in a human subject a year later by Rosenstein, who made a lateral

anastomosis between the vena cava and portal vein. This was only temporarily successful. It is a difficult, dangerous operation in man, and apt to be followed by obliteration. Bier reported two attempts, both unsuccessful, in 1911. Kocher, of Berne, calls the operation unthinkable. The writer, therefore, employs the lower vena cava and the superior mesenteric vein as an easier technique, having worked it out on twenty cadavers. He found it easy in sixteen out of twenty.

B. M. Bernheim,[2] of Baltimore, states that Ruotte in 1907 suggested that ascitic fluid be drained into the general circulation by means of the saphenous vein. This is an operation of great uncertainty, and the results obtained were unsatisfactory, especially as there was a high mortality. Ruotte, in employing the saphenous vein, dissected it for a few inches from the saphenous opening, where it was divided and the distal end tied off. The proximal end was drawn upward to the peritoneum and inserted into the free cavity. The anastomosis can be done at one sitting or at two, as most convenient. About twenty-five of these operations have been recorded. In one of his cases a hernial sac furnished a great facility for anastomosis with the vein. After the anastomosis of the vein had been obtained, some leakage of hepatic fluid delayed wound healing for a time. The patient in this case died in a few days, and no autopsy was permitted.

References.—[1]*Amer. Jour. Med. Sci* 1916, i, 806; [2]*Surg. Gyn. and Obst.* 1916, i, 605.

ASTHMA. *Lewis A. Conner, M.D.*

The theory that asthma represents an anaphylactic phenomenon has come to have fairly wide acceptance, and at the present time the bulk of investigation is directed toward the explanation of its mode of origin and the development of an effective method of treatment. Cooke and Vander Veer[1] have studied anaphylaxis in connection with hay fever, which is closely related to asthma. They showed that while the state of sensitization is not transmitted to offspring, nevertheless many of the patients seem to have inherited the tendency to produce antibodies against certain proteins. The nearer the heritage is, and the more marked, the earlier it develops in the patient. In the study of the materials to which the patients are sensitive they find that those reacting to one of a group of pollens or proteins tend to react more or less to all of that group. On the basis of such studies the method of treatment has been to identify first the protein which causes the symptoms, and then to immunize the patient by injections of that protein. Results have varied a great deal, but the method is yet new, and the dosage not well understood, and it is reasonable to expect much from it in the future.

Iskowitz[2] sees the cause of asthma in the absorption of nasal and bronchial secretions, and therefore treats his cases by the injection of sterilized, carbolized specimens of secretion collected through a bronchial catheter or from the nasopharynx. He claims to have obtained some improvement in the cases so treated.

The condition known as horse asthma is a little more clear-cut than many of the asthmatic conditions, and is naturally treated by some product derived from the horse. L. A. Levison[3] has had a few good results from the use of injections of graduated amounts of **Horse Serum.**

Rogers[4] in India has had better results from the use of **Vaccines** made from streptococci grown in cultures of the sputum. The region in which he works is noted for the amount of asthma, and he has had opportunity of seeing a good many cases. He is of the opinion that the disease is due, at least in part, to infection. He also reports a short series of cases in which the vaccine apparently produced a very definite improvement. Cooke and Vander Veer are the only authors who present a series of cases large enough to be used as any basis for the construction of a theory or method of treatment, and their conclusions must therefore carry so much the more weight.

Harmer reports great improvement in a case after treatment by **Ultra-violet Radiation** (*p.* 53).

[Clinical experience shows the direct relationship between many forms of asthma, gout, and eczema. Many cases of asthma, commencing in early life, date from the sudden suppression of an eruption; also an acute attack of gout may give immediate relief to the asthmatic condition. The therapeutic indication in many cases is to produce an eruption over the epigastrium and maintain it by the continuous use of **Moist Compresses** for several weeks. At the same time the uric acid from the tissues should be got rid of by the systematic use of **Moist Hot-air Baths.** The following is the formula of the application used by Percy Wilde at the Lansdown Hospital, Bath, for producing the eruption :—

℞	Ol. Sinapis Vol.	℥ij	Ol. Camphor. Essent. ad ℥viij		
	Ol. Crotonis	℥viij			

To be applied as often as necessary to produce and maintain the eruption.

For relief of the symptoms, the following formula has been found almost specific in many cases treated at the hospital : —

℞	Tinct. Ipecac.		Liq. Pot. Arsenit.		℥xxx
	Tinct. Opii	āā ℥iss	Pot. Iod.		gr. xlviij
		Aq. ad ℥iij.			

One ounce in water after each meal and at bedtime.]

References.—[1]*Jour. Immunol.* 1916, i, 201 ; [2]*N. Y. Med. Jour.* 1916, cii, 950 ; [3]*Ibid.* 901 ; [4]*Pract.* 1916, xcvi, 573.

BERI-BERI. *Sir Leonard Rogers, M.D., F.R.C.P.*

A. Breinl[1] records experiments on polyneuritis in pigeons, which bear on the question of the infectiveness of the disease. McCarrison[2] has published experiments in which he produced symptoms indistinguishable from polyneuritis gallinarum, with cultures from the organs of pigeons suffering from that disease. Breinl's observations do not

support this view, as pigeons, if properly fed, never contracted the disease when put in cages in which others had previously died of the affection; nor was the appearance of the first symptoms shortened by keeping a successive series of pigeons fed on a neuritis-inducing diet in the same cage.

REFERENCES.—[1]*Jour. Trop. Med.* 1916, June, 130; [2]*Ind. Jour. Med. Research*, 1914, vol. ii, No. 1.

BILE-PASSAGES, SURGERY OF. (*See also* GALL-BLADDER.)

E. Wyllys Andrews, M.D., F.A.C.S. (*Chicago*).

Holmes[1] reports a detailed study of a case of *congenital obliteration* of the bile-ducts, and sums up the literature, finding that 16 per cent of cases are theoretically amenable to operation. He advises that laparotomy should always be done, and cholecystenterostomy or some other procedure be instituted.

Bazy[2] reports two successful enterobiliary anastomoses for benign common-duct obstruction. In one the hepatic duct and in the other the common duct was implanted in the duodenum. Branet records another in which the patient died eighteen months later with returning jaundice. Capelle[3] reports a similar successful case, with an accompanying cholecystectomy.

W. J. Mayo[4] speaks of the good results obtained by re-operation on bile-ducts injured during cholecystectomy. He used the T tube, Sullivan tube, and Coffey's methods, with equal success. The results are in contrast to similar operations done for palliation of malignant obstruction, which gave very large mortalities. In this condition the operation of choice is cholecystenterostomy, of which Erdmann and Lloyd[5] report a series of seven with four deaths. They assert, however, that the operation is justified, because the diagnosis is never certain, and may be amenable to radical cure, and when the patient recovers, he lives longer and is not in pain.

Harrigan[6] reminds us of the possibility of gaining access to stones in the lower portion of the common duct by the transpancreatic route. He finds three cases in the literature—Stefana's and McGraw's being successful, and Terrier's dying on the second day because the ampulla of Vater was accidentally included in a ligature.

Lewisohn[7] reports an exceedingly rare case of intrahepatic calculus. The patient had acute pain, chills, fever, and boardlike abdomen, and the diagnosis was acute cholecystitis and perforated duodenal ulcer. On laparotomy, a small abscess in the liver on its lower surface was found, which had ruptured. In the bottom of the cavity were two gall-stones. On the diaphragmatic surface another nodule was felt, and on incision four black gall-stones were found. There were also six yellow stones in the gall-bladder. Drainage of all three foci was instituted, and the patient recovered.

REFERENCES.—[1]*Amer. Jour. Dis. Child.* 1916, xi, 405; [2]*Bull. de l'Acad. de Méd.* 1916, lxxv, 35; [3]*Deut. med. Woch.* 1915, xli, 442; [4]*Surg. Gyn. and Obst.* 1916, xxii, 1; [5]*Amer. Jour. Med. Sci.* 1916, Aug. 174; [6]*Surg. Gyn. and Obst.* 1916, July, 14; [7]*Amer. Surg.* 1916, May, 535.

BILHARZIASIS. *Sir Leonard Rogers, M.D., F.R.C.P.*

F. G. Causton[1] deals with this disease in South Africa, and confirms the recently discovered stage of the parasite in certain small water-snails, which accounts for infection through bathing in open water. He finds the incubation period to be about two months. The infection tends to die out, and rarely shortens life in South Africa. **Hexamine** is the most useful treatment in uncomplicated cases.

A. C. Reed[2] discusses *Schistosomiasis japonica* at length, and says no treatment is effective, so that prophylaxis is most important, either by the destruction of the infective agent, which is very difficult in the Far East, where the paddy-field method of agriculture is universal and the fields are used as latrines, or by protecting human beings against infection by wearing waterproof boots.

R. T. Leiper and Gordon Thomson[3] report the results of a mission to Egypt to study the infection of bilharzia in 1915, and describe the snails in which part of the life history occurs. As regards prophylaxis, they found that the methods of filtration in ordinary use do not prevent the passage of the cercariæ into drinking water. Two 1-grm. tabloids of sodium bisulphate in a quart of water killed them, but 1–1,000,000 of chlorine failed to do so.

References.—[1]*S. Afric. Med. Rec.* 1916, Apr., 99; [2]*Amer. Jour. Trop. Dis.* 1915, Nov., 250; [3]*Jour. R.A.M.C.* 1916, Aug., 171.

BLACKWATER FEVER. *Sir Leonard Rogers, M.D., F.R.C.P.*

J. W. W. Stephens[1] has analyzed the duration of hæmoglobinuria in 167 cases of blackwater fever, and found it to be not more than twelve hours in one quarter, not over one day in half, and not more than two days in three-quarters of the cases. S. R. Christophers and K. R. K. Iyengar[2] have investigated the effect of hæmolytic drugs, toxins, and anti-sera upon the hæmolytic point (isotonic point) and the association between this point and the hæmoglobinuria. They obtained negative results with potassium chlorate, carbolic acid, sodium glycocholate, sodium taurocholate, quinine, diphtheria toxin, and pyocyaneus toxin. The substances which caused hæmoglobinuria were pyrogallic acid, abrin, and hæmolytic serum, which all raised the hæmolytic point: but hæmoglobinuria was never produced until that point reached 1·0 to 0·9 per cent. at which point it always appeared. Christophers and Bentley found no distinct raising of the hæmolytic point in blackwater fever, so the process in that disease is probably quite different from the action of the toxins investigated.

References.—[1]*Ann. Trop. Med. and Par.* 1915, Dec., 539; [2]*Ind. Jour. Med. Research*, 1915, Oct., 232.

BLADDER, DISEASES OF. *J. W. Thomson Walker, M.B., F.R.C.S.*

Freund[1] reviews the operations for *ectopia of the bladder*, and discusses fully the operation introduced by Makkas. This consists in utilizing the cæcum as a bladder, and the appendix as a ureter. Details of five cases are given. Obstacles to the operation are: Previous removal of the appendix, inflammatory changes in the appendix,

pericæcal adhesions. Freund concludes: The operation should not, if possible, be performed on children under five years. Six or eight weeks should elapse between the preparation of the cæcum and appendix, and the removal of the bladder. Examination of the urines of each kidney, obtained by ureteral catheter, should be made previous to the operation. If bilateral pyelonephritis be present, operation should be refused. Freund believes that Makkas' is the operation of choice in ectopia.

Heineck[2] analyzed the cases of *hernia* of the bladder, recorded from 1896 to 1914, and added some personal cases—in all 159 patients, representing 164 vesical hernias. The following symptoms are suggestive of a vesical hernia before operation: (1) Urinary disturbances: dysuria, two-stage urination, frequent urination, scalding urination; (2) A hernial swelling, pressure upon which causes a desire to micturate, and which increases in volume with urinary retention, and markedly diminishes in size with urination; (3) A hernial swelling, the size of which is increased by air or water distention of the urinary bladder; (4) A hernial swelling in which fluctuation is detected, or into which a metallic sound can be introduced by way of the urethra; (5) A hernial swelling in which, after easy reduction of most of the contents, there persists a small doughy mass representing the extruded part of the bladder.

During the course of a hernia operation, the following symptoms or signs are suggestive of vesical hernia: (1) An unusual amount of fat in the neighbourhood of a hernial swelling; (2) Difficulty in finding or in isolating the true hernial sac from the tumour mass; (3) The trabeculated appearance of the bladder muscle; (4) Large-sized external hernial opening, and the fact that hernias of the bladder are usually nearer the middle line than true hernial sacs; (5) The occurrence of a second hernial sac is so rare that it is safe, until forced to do otherwise, to regard as the urinary bladder any structure resembling a second hernial sac; (6) The pedicle of a herniated bladder process leads down behind the pubic bone into the true pelvis; the pedicle of a true hernial sac leads to the general peritoneal cavity.

Passage of a sound into a cystocele, cystoscopic confirmation of its existence, and escape of urine following wounding of the bladder, are all conclusive signs. Injury to the bladder may not be noticed at the time of operation, and be diagnosed several hours afterwards by: (1) Voluntary voiding or withdrawing by catheter of blood-stained urine; (2) Urine escaping from the hernial operation wound; (3) Sepsis due to urinary extravasation; (4) Peritonitis due to the escape of urine into the peritoneal cavity.

Writing on *injuries of the bladder and urethra in war*, Fullerton[3] says two lines of treatment were adopted at the casualty clearing stations—the tying-in of a catheter, or suprapubic cystotomy. Wounds of the bladder are frequently complicated by fractures of bones and injuries to vessels, nerves, or viscera. A troublesome complication is involvement of the rectum, with discharge of fæces

into the bladder, or urine into the bowel, or of both through the wound in the soft parts. Intraperitoneal wounds are usually reached easily, whereas extraperitoneal wounds, especially those at the base or sides, may be inaccessible. The missile may stop short after wounding the bladder, it may enter and remain in the viscus, or it may pass through. Intraperitoneal injury will probably be associated with injury to the intestine, and the usual signs of a ruptured viscera will be present. Urine may be discharged into the peritoneal cavity in such quantities that none passes by the urethra. A perforating wound of the abdomen in the bladder region will generally be explored before reaching a base hospital. If the wound is small, valuable information may be obtained as to the size and position of the opening, or openings, and the presence or absence of a foreign body. If urine can be passed, hæmaturia will probably be present, but hæmaturia may occur when there is no direct wound of the bladder.

In extraperitoneal wounds, the chief signs and symptoms are escape of urine from the wound, hæmaturia, and, later, cystitis. The urine may not escape from the wound for several days after the injury. The patient may pass urine by the urethra, but the fistula will leak more or less continuously in addition. The leak may be continuous when the opening is large, and only on distention of the bladder and micturition if it is narrow. Hæmaturia may be severe, and the bladder may be filled with clot.

Intraperitoneal wounds will usually be treated at the casualty clearing stations. The wound in the bladder wall, if easily accessible and of moderate dimensions, may be excised so as to bring healthy surfaces together. The author recommends sterilizing the edges with the thermocautery. Continuous catgut sutures are used to close the bladder wound. In extensive wounds an attempt should be made to render them extraperitoneal. In the majority of wounds operated on at the front, the viscus has been completely closed. According to the author, a catheter should be passed every four hours "until it is judged that the union is firm."

In extraperitoneal wounds where the rectum is also wounded, a transverse colotomy must be done, to divert the flow. The track is frequently long and tortuous, but the wound discharging urine is, in many cases, "surprisingly healthy," and does not require further operation on the bladder, provided the wound in that viscus can be kept clean and the external wound adequately drained. This treatment, the author states, is not in accord with the usually accepted practice, which is to perform suprapubic cystotomy.

Wounds of the urethra are divided into those of the pendulous urethra, which are infrequent, and those of the fixed urethra, which are comparatively common. Concurrent injury to the rectum may occur in anteroposterior wounds. The injury to the urethra varies from slight contusion to complete destruction of a segment. The usual method of treatment has been to attempt to pass a catheter,

and, if successful, tie the instrument in, and send the patient to the base. Should catheterization fail, suprapubic cystotomy is performed. The author prefers to incise the perineum, remove clots and tags, arrest hæmorrhage, and leave the wound widely open. If there is retention of urine, suprapubic puncture of the bladder should be resorted to until micturition through the perineum has been established.

Grey Turner[4] reports three cases illustrating: (1) A shrapnel bullet in the bladder; (2) A piece of shell casing which was voided with the urine, and became impacted in the urethra; and (3) Perforating gunshot wound of the pelvis followed by the impaction of a sequestrum in the urethra. He recommends several *x*-ray exposures in different positions to show the movement of the foreign body in the viscus. Cystoscopic examination is necessary, as the metallic foreign bodies may be present in the bladder. Small foreign bodies may escape with the urine, or be removed in the eye of an evacuating catheter, or by a specially modified lithotrite (Legueu). For shrapnel bullets, large or ragged fragments of shell, or encrusted foreign bodies, the suprapubic route is the operation of choice.

In *chronic trigonitis*, Walther[5] states that although the changes are chiefly confined to the trigonum vesicæ, it is rare to find the internal sphincter and, in the male, the posterior urethra, totally free. The mucous membrane of the trigone is intensely red, and the vessels are engorged; later, there are swelling and œdema, and the surface is spongy or woolly in appearance. In more advanced cases there are stiff folds and ridges, with shreds of muco-pus and desquamated epithelium adhering to the surface. The cause may be a primary infection, or secondary to some pelvic disease, including urethritis and cystitis. It is more common among women than men. The urine may be free from bacteria, or any of the bacteria common in the urinary tract may be found. Hyperacidity of the urine may be present. The most troublesome symptom is the marked frequency and urgency of micturition. The diagnosis is made by the cystoscope, and the condition must be differentiated from hysteria with vesical symptoms, stammering bladder, and essential incontinence.

Treatment consists in avoiding all irritating foods, drugs, and alcohol. **Urotropine** is given in 15-gr. doses every three hours. Irrigations do not give good results, but "a warm irrigation, combining in solution 1–10,000 **Nitrate of Silver** with 1–8000 **Potassium Permanganate**, may be tried." Better results are obtained by the use of instillations and topical applications of silver nitrate. After inducing local anæsthesia by the injection of novocain, alypin, or eucaine, 30 to 60 min. of a 2 per cent solution of silver nitrate are instilled twice weekly. Through a Kelly tube a solution of 5 per cent silver nitrate may be applied to the trigone. Curetting through a suprapubic wound, followed by suprapubic drainage, is mentioned as a last resource.

Gardner[6] reviews the results obtained in 1702 cases of operations on *tumours of the bladder* by various methods during the last fifteen years, and concludes: In treatment of carcinoma, the transperitoneal method, as used in the Mayo clinic, or the subtotal cystectomy of Squier, with wide resection of the bladder wall, offers the best results. These methods give the operator opportunity to look for enlarged glands, or metastases, and, if necessary, the ureters can be easily transplanted. Cystotomy and excision, and the actual cautery, should only be used in terminal cases as a palliative method, to relieve pain and hæmorrhage. When the growth involves both ureters, Watson's operation of total cystectomy, with a primary operation for transplanting the ureters into the loin, shows the best results.

In the treatment of papilloma, intravesical **High-frequency Current**, during the short time it has been used, has given better results than any other method; time and statistics will determine whether the method, by reason of the difficulty in distinguishing between papilloma and carcinoma, is shown to be as satisfactory as wide resection, such as is advised for carcinoma.

The treatment of benign papillomata of the bladder with high-frequency currents is discussed by Beer.[7] He insists on the importance of obtaining portions of the growth by means of Buerger's forceps or Young's rongeur, for microscopic examination. Malignant growths do not respond to this treatment. Occasionally the microscope may be misleading, as specimens taken from the surface may be benign papillomata, while deeper parts may be malignant. There appears to be a slight difference in the way the monopolar and the bipolar currents act, when tested on raw beef. The monopolar current produces a more marked local action at the point of application of the electrode, and a less marked though distinct distant action: apparently a cauterization and coagulation. There is an explosive action also. The bipolar current has no, or very slight, explosive action, a less marked local action, and a more marked distant coagulation action. Beer believes that on this account it is inferior to the unipolar current. Further experience may demonstrate that a combination of both currents, first a brief application of the bipolar, and subsequently the use of the unipolar current, may give more rapid results. He claims that even the largest papillomata may be treated by this method. Tumours situated at the neck of the bladder, which bleed readily, will require suprapubic operation. So also will cases where the growths are inaccessible—hidden in diverticula, or pouches lying in an intolerant bladder. Beer's opinion is that definite cures can be obtained by this method. His earliest cases were treated four years ago, and show no recurrence.

Bugbee,[8] after a review of the use of the high-frequency current in the treatment of tumours and other pathological conditions of the urinary tract, concludes: The high-frequency monopolar current causes superficial destruction of tissue, and the bipolar current causes deeper destruction. It is the method of choice in dealing with benign

papillomata of the bladder. Malignant papillomata and circumscribed carcinomata are best treated by wide resection of the bladder wall, and destruction of recurrences by means of the bipolar current. Extensive carcinoma of the bladder wall may be retarded, and the symptoms lessened, by the bipolar current. Certain types of vesical obstruction, due to a small amount of tissue, may be cured by the destruction of this tissue with the monopolar current. The bipolar current probably assists in dilating the ureter with the olivary bougie, and the monopolar current may be an aid in relieving a calculus lodged in the lower ureter, or at the ureteral orifice. The monopolar current may be of assistance in reducing a hypertrophy of the verumontanum, or in destroying a urethral papilloma.

Diathermy in malignant tumours of the bladder is the subject of an article by Schmidt and Kolischer.[9] They state that a unipolar current was first used, but it was later found more convenient to use two polar electrodes. This may be carried out in two ways. One of the electrodes may be of large size, and applied as the indifferent electrode to any part of the body, while the other, the swollen electrode, is used directly for the operation proper. By the second method the electrodes, both of small size, are used for the operation. " the size of each electrode being in reverse proportion to its intended active influence on the tissue." This latter arrangement of the high-frequency current leads to a still further development of its application to tumours. While the use of an active pointed electrode is confined to cauterization of the pathological tissue, or to its bloodless excision, the application of two active disc-shaped electrodes permits of the complete coagulation of tumour masses at any desired depth, and to any extent planned. This is accomplished by placing the electrodes opposite to one another at a variable distance, sometimes at various diameters of the growth. The high-frequency apparatus must be equipped so that a gradual measured increase or decrease in the current is possible. Tissues already coagulated offer a greater resistance, and as the process of coagulation starts at the periphery, a progressively increasing current will become necessary to produce the coagulation effect in the central portions of the tumour mass. In operating on malignant tumours of the bladder, it is expedient to have both electrodes inside the viscus, in close proximity to the tumour. Disc-shaped or knife-shaped electrodes are used, according to the character of the growth. A leathery area without bleeding parts is left after the operation. For these manipulations the bladder is opened suprapubically. The retractors should be made of wood or fibre. Mesothorium is applied through the suprapubic opening after the operation.

Beer[10] has observed a number of children suffering from *chronic vesical urinary retention*, where the condition had been unrecognized and the children were deteriorating in health. The clinical picture suggested chemic interstitial nephritis. The face was pale and pasty, the child apathetic, and there was difficulty, and sometimes pain, on

micturition. The bladder was found distended. Eventually all the patients became infected, and the ureters, and one or both kidneys, became dilated. Frequently the neurological examination of these patients showed nothing abnormal; in others, distinct evidence of a cord or brain lesion was found. Even in those cases in which the most complete examination failed to reveal a definite disturbance in the nervous system, post-mortem examination (three cases) showed definite cord lesions. From analogy, the author believes that other cases, where no nervous symptoms were detected, and there was no local physical obstruction, were due also to spinal lesion. Beer gives a table to show the varying etiology of these cases: (1) Mechanical obstruction—(*a*) Extravesical: congenital folds and stricture, tight prepuce, small meatus, new growth; (*b*) Intravesical: diverticulum of bladder, stone. (2) Neuromuscular—(*a*) Brain disease; (*b*) Spinal cord disease; (*c*) Spasticity of sphincter, without definite neurological signs, probably disease of the sacral cord. Treatment consists in the relief of obstruction, if present, and drainage of the paralyzed non-obstructed bladder to prevent dilatation of the ureters and kidneys.

Davis[11] describes a **Vacuum Apparatus** for *vesical drainage*, and gives a brief review of methods previously used. The apparatus consists in a urine bottle connected with a catheter in the bladder. In this bottle a low vacuum is maintained by means of a second larger bottle with which it is connected by a minute capillary tube, a complete vacuum having been produced in the larger bottle by means of a hydraulic or filter pump. A mercury manometer is appended to the tube leading from the urine to the vacuum bottle, which allows air to enter the urine bottle if the vacuum in it becomes too high. This acts as a safety valve which prevents the pressure within the urine bottle from differing from atmospheric pressure by more than 20 mm. of mercury, and therefore prevents the catheter from exerting more than the gentlest suction within the bladder. Also, when an occasional siphonage takes place from the bladder to the urine bottles and the pressure within the urine bottle rises above that of the atmosphere, the mercury manometer permits the escape of air from the bottle. The apparatus is attached to a catheter in the suprapubic wound at the time of the operation or, if there is much bleeding, at a later date. The tube or catheter is changed every three or four days, smaller catheters being substituted as the fistula granulates, and the interval between the removal of the catheter and the final healing is reduced to a minimum.

Churchman[12] uses a rotary electric suction pump to draw the urine from a suprapubic tube into a urine bottle, and applies the same form of suction to the bladder during constant irrigation, the inlet being through either a urethral catheter or a suprapubic tube. For this purpose he has introduced a metal tube and plate to be applied to the suprapubic wound; the tube having two compartments, one for the insertion of a rubber catheter for the ingoing stream, and the other

for a drainage tube for the outgoing stream. [Marion, some years ago, introduced a similar all-rubber tube for constant irrigation after suprapubic prostatectomy.—J. W. T. W.]

REFERENCES.—[1]*Surg. Gyn. and Obst.* (abst.) 1916, ii, 89 ; [2]*Ibid.* 1916, i, 592 ; [3]*Brit. Med. Jour.* 1916, ii, 245 ; [4]*Lancet*, 1916, i, 958 ; [5]*Med. Rec.* 1916, i, 853 ; [6]*Ann. Surg.* 1915, ii, 456 ; [7]*Ibid.* i, 735 ; [8]*Surg. Gyn. and Obst.* 1915, ii, 581 ; [9]*Surg. Gyn. and Obst.* 1916, ii, 223 ; [10]*Jour. Amer. Med. Assoc.* 1915, ii, 1709 ; [11]*Ibid.* 1916, i, 1680 ; [12]*Johns Hop. Hosp. Bull.* 1916, Mar., 69.

BLOOD TRANSFUSION. *W. I. de C. Wheeler, F.R.C.S.I.*

The direct transfusion of blood has been followed by remarkable success in cases of hæmorrhage and toxæmia in the surgery of the war. The old idea that an isotonic solution of salt was a perfect substitute for blood has already been disputed by Crile and Carrel. Very promising results have followed the application of this treatment in pernicious and secondary anæmias, and it is now a recognized method of dealing with hæmorrhagic disease in the newly-born. Robertson[1] states that transfused blood not only helps to restore the depleted bulk of circulating fluid, but provides the patient with that particular body tissue to the loss of which his symptoms are due. It provides coagulation elements, and fresh complement and antibodies. As much as 1000 c.c. can be taken from the donor without ill effect. Robertson recommends the use of 'Record' syringes, and deprecates the employment of apparatus which prolong the operation and require special skill.

REFERENCE.—[1]*Brit. Med. Jour.* 1916, ii, 38.

Herbert French, M.D., F.R.C.P.

In cases of blood loss from excessive hæmorrhage, and in various blood-states, such as pernicious anæmia, splenic anæmia, secondary anæmia of obscure origin, post-operative debility, and other conditions, an increasing number of authorities advocate the direct transfusion of human blood. This may be withdrawn from the donor into a receiver, and thence transfused into the patient ; may be transferred directly from donor's artery to recipient's vein : or, least difficult of all, may be transferred directly from donor's vein to recipient's vein. The technique involved is improving year by year, and Percy[1] gives a full description of that which he has employed successfully in 54 cases :

In the *Journal of the American Medical Association* Kimpton described an indirect method of blood transfusion, by draining off blood from the radial artery into a paraffin-coated tube, designed by Brown, and injecting this blood into the median basilic vein of the recipient. The tube now to be described (*Fig.* 13) is a modification of the Brown tube, with the object of making a venous transfusion tube, and also a tube more easily constructed. It consists of a glass cylinder, 4 cm. in diameter, with a cannula leading from one end, the other being drawn out into a tube about 1 cm. in diameter to which a T, connection is made. To one arm of the T a rubber tube is attached for suction to aid in filling the tube, and to the other a rubber bulb is

connected to aid in injecting the blood. The tube differs from the Brown tube in that there is no side tube coming off from the cylinder, and the upper end of the cylinder, instead of being closed with a large cork, is drawn out into a tube for the T connections as described above. The cannula is so constructed that it can be inserted directly into the vein of the donor and then into that of the recipient. An open dissection of the vein of both donor and recipient is made, for two reasons: (1) If the operation was done subcutaneously, it would be necessary to use a needle with a rubber connection to the cannula, which connection would make a roughened area that would favour clotting, whereas with the smooth paraffin-coated cannula there is no such tendency; (2) After the tube is filled with blood, the cannula can be inserted into the vein of the recipient without delay, an essential feature after blood has been withdrawn.

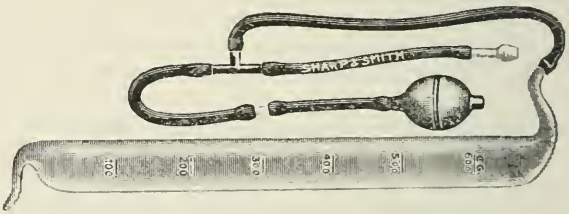


Fig. 13.—Instrument used in indirect method of transfusion of blood.

The dangers of transfusion are two, i.e., immediate and delayed. The immediate dangers are embolism either from air or clotted blood, or such acute dilatation of the heart, consequent to such rapid inflow of blood, that the recipient's heart is overwhelmed. The delayed danger is that from hæmolysis, which cannot always be eliminated by the most careful tests prior to the operation. A hæmolytic test of each blood upon the other should be made before transfusion, because it has been found that in a small percentage there is a tendency of the serum or corpuscles to cause a disintegration of the red cells of the blood from another individual, even if the latter be a near relative. This is especially likely to occur in cases of tuberculosis. Crile finds that it happens in 5 per cent of patients suffering from tuberculosis. Bernheim states that in 800 reported transfusions there were 15 instances of macroscopic hæmolysis; in these there were 11 recoveries and 4 deaths. No hæmolytic tests were made in three of the instances where death occurred. In the fourth case tests were made, and it was known that the donor's cells were slightly agglutinated by the patient's serum, but since agglutination is an entirely different process from hæmolysis, it was considered fairly safe to use this donor, and a fatality occurred. Tests were made in 11 of the 15 recoveries, and in 9 instances hæmolysis was prognosticated.

Percy's experience differs from these findings. In both of the cases where fatal hæmolysis occurred, the hæmolysis tests were absolutely

negative. In the patient who showed slight reaction, both the hæmolysis and the agglutination test, as described by Rous and Turner, were perfectly negative. In another case which showed a beautiful unmistakeable agglutination (Rous-Turner), but negative hæmolysis, transfusion of 800 c.c. of blood was performed, smoothly and without the slightest sign of any discomfort to the recipient. Only once has the hæmolysis test been positive. In view of these facts, Percy deems it essential to make, in addition to these tests, a preliminary transfusion of 20 c.c. of blood, believing that this amount of blood will indicate hæmolysis, if it is to occur, without serious sequelæ.

Besides making a test for hæmolysis, a careful history should be obtained from the donor and, if at all suspicious, a Wassermann reaction should be made. Donors should not be chosen from persons giving a history of recent attacks of typhoid fever, pneumonia, diphtheria, tonsillitis, malaria, or influenza, or from persons suffering from tuberculosis, chronic arthritis, rheumatism, or where there is a history of hæmophilia.

The agglutination test Percy uses is that described by Rous and Turner. The hæmolysis test used is as follows: 10 c.c. of blood are collected from a vein of the donor (D), 5 c.c. of which are placed in a dry centrifuge tube and allowed to clot, and the remaining 5 c.c. mixed thoroughly with 10 c.c. of a $\frac{1}{2}$ per cent sodium citrate solution in normal salt solution. The latter solution preserves the red cells and prevents clotting. Both tubes are now rapidly centrifuged. In one tube the clotted blood will separate, leaving a clear serum as an upper layer; 1 c.c. of this serum is then added to 9 c.c. of normal salt solution in a test-tube and labelled 10 per cent solution of D's serum. The other centrifuge tube now contains a compact layer of red cells in the bottom and an upper clear layer of mixed serum and salt solution. This upper layer is carefully poured off, and the same amount of fresh normal salt solution is added with a pipette so as to mix the cells. The tube is again centrifuged. This proeedure is repeated ten or twelve times in order to wash the red corpuscles thoroughly free of serum. Finally, 1 c.c. of the corpuscles is mixed with 9 c.c. of normal salt solution in a test-tube and labelled 10 per cent suspension of D's corpuscles. Ten c.c. of blood are collected in the same way from the recipient (R), and a 10 per cent solution of serum and a 10 per cent suspension of cells are prepared as above and placed in separate test-tubes. These four 10 per cent solutions and suspensions are used in setting up the test.

In a clean test-tube, 1 c.c. of D's serum is mixed with 1 c.c. of D's corpuscles. In a second tube, 1 c.c. of R's serum is mixed with 1 c.c. of R's corpuscles. These two tubes are used as controls. In a third tube, 1 c.c. of R's serum is mixed with 1 c.c. of D's corpuscles. These three tubes are placed in the incubator at 37·5° C. for two hours, during which interval the tubes are shaken several times. They are then placed in the ice-box for twelve hours and shaken occasionally to insure mixing. If the blood-cells remain as a layer in the bottom of

the test tubes and there is a clear, nearly colourless, fluid above, or if the tube when shaken be quite cloudy and not transparent, there has been no hæmolysis. If there are no red cells present as a layer, or if the shaken tube is clear, there has been hæmolysis of the red cells. The two control tubes should show no hæmolysis. If they do, there has been an error in technique.

Preparation of Tube.—The tube should be cleansed by washing with water, alcohol, and then with ether, and after it is perfectly dry, 2 oz. of melted grocer's paraffin is poured into the tube through the upper end. It is then wrapped in a towel and placed in a steam autoclave for fifteen minutes under fifteen pounds of pressure, after which, with sterile rubber gloves over the hands, the tube is rolled around while cooling so that every part of the inside is covered with melted paraffin and any excess allowed to run out of the large end. Care should be taken not to allow the cannula to become plugged with paraffin. If it does, the tip is warmed over a flame and the paraffin allowed to run back into the tube. Sterilizing the rubber tubing, glass Y, and mouth-piece is done by placing them in a towel and autoclaving in the same way and at the same time as the transfusion tube, or boiling them for twenty minutes. The atomizer bulb is thoroughly washed with alcohol to sterilize it. When ready to use, the connections are all made, and 2 oz. of sterile liquid paraffin aspirated into the tube through the cannula by means of suction at the mouth-piece.

Technique of Transfusing the Blood.—The arms of both the donor and the recipient are prepared as for a surgical operation. Proper constriction of the donor's arm is essential if one wishes to draw off a large quantity of venous blood rapidly. Constriction by means of a rubber tube is not satisfactory, because the amount of pressure is not known, nor can the pressure be varied as desired. An ordinary blood-pressure apparatus placed about the arm and pumped up to 60 to 80 mm. of mercury, depending upon the rapidity with which the blood flows, makes an excellent constrictor. By this means the venous circulation is impeded, but not the arterial. It is imperative to use a separate set of instruments on different tables for donor and patient, in order not to transmit infection from patient to donor. Under local anæsthesia, using one-half of 1 per cent novocain solution intradermally, an incision is made over the cephalic vein just above the elbow in both the donor and the recipient, and a ligature placed about the vein in its proximal portion in the donor and in its distal portion in the recipient. Small Carrel clamps are placed on that portion of the vein away from the ligature in each patient, and a longitudinal incision 3 mm. long is made through all coats of each vein midway between clamp and ligature. Small retention clamps are placed on the edges of each incision in order to hold them open. The cannula is placed pointing distally into the vein of the donor, and the Carrel clamp released from the vein. By means of suction at the mouth-piece, venous blood is drawn into the tube up to the required amount. The blood is well protected from the sides of the glass by the paraffin

coat, and from the air by the liquid paraffin, which floats over and completely covers the blood. As soon as the tube is filled, which in Percy's experience averages about three and a half minutes to withdraw 400 c.c. of blood, the aspirating tube is clamped, the cannula removed from the vein, and the small clamp reapplied to the donor's vein.

The cannula is now quickly placed in the lumen of the vein of the recipient, and the Carrel clamp released. The blood will now flow into the vein of the recipient toward the heart, the velocity of the flow being controlled by careful pumping of the rubber atomizer bulb. As soon as it is evident that the blood is flowing properly, an assistant may release the constrictor from the donor and ligate the vein distally to the opening from which the blood has been taken. Not more than five minutes should be utilized in obtaining the blood, nor more than five minutes in injecting it. It is well to have two tubes ready, so that if it is found that the first tube takes more than five minutes to get the required amount, the process may be repeated with the second, aspirating only the remainder of the required amount of blood.

The advantages Percy claims for the method are: (1) Known quantities of blood may be administered; (2) As much as 600 c.c. can be given in five to eight minutes; (3) Venous blood is utilized, so that arteries such as the radial are not destroyed; (4) Transfusion may be made without contaminating donor with blood of recipient; (5) No air comes in contact with the blood; (6) There is direct communication between vein and chamber by a simple paraffin-lined glass tube. There are no metal, rubber, or other connections whose edges cause resistance to the flow of blood; (7) The apparatus is simple, and can be made by any good glass-blower.

REFERENCE.—[1]*Surg. Gyn. Obst.*, 1915, Sept., 360.

BLOOD-VESSELS, INJURIES TO. *W. I. de C. Wheeler, F.R.C.S.I.*

A volume would be required to deal in a superficial way with the varieties of injury to blood-vessels as experienced in the war. Secondary hæmorrhage after severe wounds of the face is only met with on a large scale by a limited number of surgeons engaged in military surgery. Patients with shattered faces naturally remain for a prolonged period in secluded places—for the most part, in the jaw-huts connected with a few of the hospitals at the front. A case in which the jaws are comminuted, with the nose, mouth, and eyes injured, is particularly prone to develop secondary hæmorrhage following severe infection. Thus, the lingual, facial, dental, and other arteries on both sides may bleed simultaneously, and if not controlled, the loss of blood will prove rapidly fatal. The administration of an anæsthetic in such cases can be better imagined than described. To secure the bleeding points locally is often well-nigh impossible. Ligature of the external carotid artery is more difficult than the text-books would have us suppose, and, when completed, controls the hæmorrhage in a number of cases to a very limited extent. Ligature of the common

carotid artery is followed in a number of extensively septic cases by hemiplegia. In such difficult circumstances it is probably best to perform a preliminary laryngotomy and expose the common carotid artery. An assistant compresses the artery in order to give time to the operator to secure the bleeding points. A catgut ligature is placed round the artery, but not tied. The wound is sutured, and the catgut, with long ends, left buried. If hæmorrhage should recur, the wound is rapidly opened and the catgut ends are tied.

Kuettner[1] gives some experiences in injuries of the large blood-vessels, including aneurysms, in war, based upon 249 cases in the Græco-Turkish, South African, and the present wars. Next to nerve injuries, aneurysms are the most interesting to the surgeon. These classes of injuries give the greatest contrasts in peace and war. In vascular surgery, however, unlike that of the nerves, the surgeon can see the success or failure of his intervention at once without having to wait an indefinite period.

Injuries to the large blood-vessels are so serious, and the operative difficulties so great, that their treatment should be left to the most experienced and skilful surgeons. Kuettner classifies blood-vessel injuries in three groups: (1) Injuries with external hæmorrhage; (2) Injuries with internal hæmorrhage; and (3) Complete aneurysms.

Regarding external hæmorrhage, Kuettner states that the percentage of soldiers who die from hæmorrhage on the battlefield depends on the kind of battle and the class of weapon. In artillery wounds, fragments of shells, and especially pieces of steel grenades, cut through the vessel like a knife, and there is a large external hæmorrhage. The crushing effect, even of the large modern projectiles, counts for much less than the effects of splinters.

Aneurysms are more frequent with the present-day jacketed bullets than formerly. The small entrance and exit wounds make it more difficult for the blood to flow. Regarding treatment of hæmorrhage in the field the author states: In venous hæmorrhage, pressure bandages are usually sufficient. Ligation is rarely necessary. In arterial hæmorrhage, in about half of the cases, ordinary means—elevation of parts, pressure bandage, or tampon—suffice. Of 421 arterial hæmorrhages, only 201 required ligation.

When the firing is at close range, death from hæmorrhage is more common. Regarding aneurysms, they rarely result from grenade splinter or shrapnel wounds, which are likely to be fatal. They are rare in wounds from jacketed bullets with fracture of the large bones; they occur only occasionally when the entry and exit wounds are large.

Secondary hæmorrhages are even more important than primary. These may be the result of infection (septic erosion), or a spicule of detached bone may injure the vessel, or it may be due to pressure of a drain in the vicinity of a vessel. It is not always noticed until the patient's condition is serious. If these secondary hæmorrhages are frequently repeated, amputation may be called for. If the secondary

hæmorrhage is from a main arterial trunk which is badly infected, amputation is the best course, as suturing and ligation are out of the question.

The author has found vast benefit from intravenous injections of **Coagulen** in parenchymatous septic secondary hæmorrhage.

With regard to internal hæmorrhages, the author says hæmatomata are usually present in all war injuries of the larger vessels. They show pulsation. Where a vein is injured, arterial blood frequently finds its way directly into the vein, causing an arteriovenous fistula, and the formation of hæmatoma is small.

Diagnosis of hæmatoma is usually easy, but it may be confounded with abscess. On account of the possibilities of perforation, infection or gangrene of hæmatoma, and the fact that spontaneous healing is infrequent, the author thinks active early surgical intervention is indicated.

REFERENCE.—[1]*Surg. Gyn. and Obst.* 1916, ii, 57.

BONE-GRAFTING. (*See* FRACTURES.)

BONE, METASTATIC CANCER OF. *W. I. de C. Wheeler, F.R.C.S.I.*

Risley[1] refers to skeletal cancer or bone metastases following operations, particularly for breast cancer. In one case there was a recurrence in the skull seven years after operation, and in a second case in the vertebral column nine years after operation.

There are some points of much interest in this paper. Mention is made of the fact that union after fracture has been reported in two cases, and that multiple metastases have been known to undergo spontaneous involution. Kaufmann has found that bone cancer is most common after cancer of the breast, thyroid, and prostate. In cases of elderly men with unexplained pain in the back or legs, the prostate should be examined for malignancy. After breast amputation, metastases of the spine are quite common. The following summary gives the main points of the paper: (1) Metastasis takes place probably by centrifugal spread along the lymphatic plexus of the deep fascia in most cases. (2) Bone metastases occur almost entirely in the areas of the body subject also to skin nodule metastases, i.e., everywhere proximal to the elbow- and knee-joints. Bones distal to these joints are very rarely involved. (3) Metastases are more frequent after cancer of the breast than any other organ, the prostate and thyroid being the next most common. (Hypernephroma of the kidney is not considered in this series.) (4) The liability of a bone to cancerous invasion increases with its proximity to the site of the primary focus. Thus the sternum and ribs are affected about equally, and more frequently than any other bones. The spine, femur, humerus, and pelvic and cranial bones come next. (5) The character of the secondary lesion always corresponds to that of the primary growth. (6) The frequency after cancer of the prostate may be as high as 25 per cent. (7) The vertebræ are the favourite seats

of attack in scirrhus of the breast. (8) The percentage of vertebral metastases is nearly 25 per cent. (9) Spontaneous fracture is present in about 24 per cent. (10) Pain is the only characteristic symptom. (11) Visible or palpable tumour is rare, while spontaneous fracture is quite common. (12) We may set down the following points as diagnostic aids: Any fracture of a long bone occurring as a result of trivial injury should immediately suggest the possibility of bone metastases and lead to careful search for the primary new growth. In all cases of painful paraplegia a neoplasm should be suspected. A diagnosis of primary bone tumours should never be made without very careful examination of the abdomen, mammary glands, prostate, and thyroid for malignancy. It is rare that careful search will fail to reveal the primary focus.

REFERENCE.—[1]*Boston Med. and Surg. Jour.* 1915, i. 584.

BONES, TUBERCULOSIS OF. (*See* X-RAY DIAGNOSIS, *p.* 44.)

BOOMERANG LEG. *Sir Leonard Rogers, M.D., F.R.C.P.*

A. Breinl and H. Priestley[1] describe and illustrate under this name a disease occurring among the aboriginals of Australia, in which a rarefying osteitis is followed by a condensing osteitis, and results in a bending of the tibia convexly forwards at the junction of the upper and middle thirds. Photographs of a case and of a section of the tibia, and a skiagram, are given (*Plates IX. X, XI*).

REFERENCE.—[1]*Jour. Trop. Med. and Hyg.* 1915, Oct., 217.

BRAIN, HÆMORRHAGE OF. *J. Ramsay Hunt, M.D.*

Shennan[1] reports some interesting observations on the *relation of miliary aneurysms to cerebral hæmorrhage*. His results obtained so far correspond very closely with those of Pick and Ellis, and may be summarized as follows: Cerebral hæmorrhage results from rupture of diseased arterioles, which may undergo a preliminary local dilatation, which in most cases probably immediately precedes the rupture, and is not pre-existent in the form of an aneurysm. The dilatations vary greatly in shape and size, but are usually larger than is associated with the term 'miliary.' Or, they may follow the formation of a dissecting aneurysm, which develops in a manner similar to that of dissecting aneurysms occurring on the large arterial trunks. True miliary aneurysms are not at all common, if, indeed, they exist at all, at the sites of cerebral hæmorrhage: they may be simulated by small collections of blood or fibrin, or of cells in the adventitial space; by localized solid swellings of the coats of the vessel—nodular atheroma, endarteritis, or a combination of endarteritis and peri-arteritis—or by small occluding thrombi. As the arterioles elsewhere in the body are also diseased, it may be presumed that the reason why they have an especial tendency to rupture in the brain substance is that their walls are thinner, or at least more friable, and that they are less perfectly supported by

PLATE IX.

BOOMERANG LEG

Case of a Queensland aboriginal, 40 years of age.

From 'The Journal of Tropical Medicine and Hygiene.'

PLATE X.

BOOMERANG LEG—*continued*

The same case as *Plate IX.* The tibia is heavier than normal, greatly increased in diameter, the crista obliterated, and almost circular on cross sections at middle of shaft (A). A longitudinal section through the middle of the tibia (B) shows a complete alteration of the structure of the bone.

From "The Journal of Tropical Medicine and Hygiene"

PLATE XI.

BOOMERANG LEG—*continued*

An X-ray picture of the same case (*Plate IX*). Taken during life, it shows the same transformation in the bone structure.

From "The Journal of Tropical Medicine and Hygiene

PLATE XII.

MILIARY ANEURYSMS AND CEREBRAL HÆMORRHAGE

Fig. A.—Arteriole showing complete rupture, and occluded by blood-platelet thrombosis and fibrin. *f.* Fold in section. (× 75.)

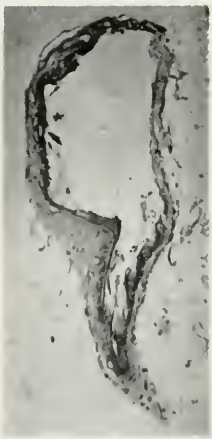


Fig. B.—Small aneurysmal (miliary) dilatation of a minute artery. It possesses some of the characters of a true miliary aneurysm. (× 195.)

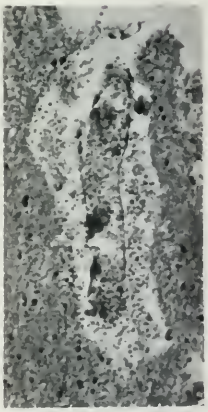


Fig. C.—Capillary dilated and with rupture in wall. Perivascular space contains blood. (× 135.)

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resistant connective tissues than elsewhere in the body, and, moreover, are surrounded by a large adventitial lymphatic. (*Plate XII*).

Guillain[2] emphasizes the occurrence of *massive albuminuria* as a symptom of diagnostic importance in meningeal hæmorrhage. It occurs early in the disease, reaches its height in from twenty-four to forty-eight hours, and then subsides. The albumin varies from 4 to 20 grms. to the litre. It was unaccompanied by hypertension or evidence of cardiac failure or renal disease. The author regards it as probably of bulbar origin, the result of the initial central shock or vascular disturbance of the hæmorrhage. This symptom has also been observed by Widal and Froin. It is, however, not constant.

Treatment.—The surgical treatment of cerebral hæmorrhage has been suggested and carried out in a limited number of cases by Horsley, Cushing, and Krause. Attempts have even been made to remove the clot by incision of the brain substance, and Cushing has recorded a successful case of this kind. These procedures have not, however, found much favour with the profession in general, and, excepting in hæmorrhages of traumatic origin, surgical measures are but rarely undertaken.

Marie and Kindberg[3] have recently advocated the surgical treatment of the comatose form of cerebral hæmorrhage by **Subtemporal Decompression** on the side opposite to the lesion. They regard the persistent coma of ordinary apoplexy as resulting from compression, the hæmorrhage and consecutive œdema forcing the hemisphere of the sound side against the resisting bony wall of the skull, and in this manner causing bilateral suspension of cerebral function. They recommend that the operative procedure be carried out on the sound side, as this method relieves the increased intracranial tension, and at the same time the danger of a too sudden alteration of pressure directly over the seat of hæmorrhage is avoided. As the danger of decompression is increased by incision of the dura, this question should be decided according to the individual necessities of the case. If the increase of intracranial pressure is not great, the dura mater need not be opened.

This procedure is applicable to cases of coma following hæmorrhage after this has lasted three hours; also in coma which comes on gradually and is persistent, as in the ingravescent apoplexy. As large areas of softening may also be complicated by secondary œdema with coma from compression of the sound side, the operation may also prove of value in compression types of encephalomalacia.

References.—[1]*Edin. Med. Jour.* 1915, 245; [2]*Presse Méd.* 1915, 441; [3]*Ibid.* 1914, 429.

BRAIN, SURGERY OF. *J. Ramsay Hunt, M.D.*

Zachary Cope[1] reviews in detail the question of *the pituitary fossa and the methods of surgical approach thereto.* He believes the nasal route of Schloffer, with its various modifications (except the submucous) to be fundamentally unsound. The sella is approached

crudely through the nasal cavities, which are usually teeming with microbes, and often harbour foci of suppuration in the adjacent sinuses; open raw surfaces are left by the removal of the turbinates and septum, which must take a long time to heal and are a constant danger of infection. Added to this, considerable deformity of the external nose may follow. Moreover, von Eiselsberg, the great advocate of this method, has to confess that a horrible odour emanates from the nose of those cases that do recover. The modifications of West and Citelli, which traverse the nasal passage, but only remove the posterior part of the septum, are open to similar objections, and the added one that the avenue of approach is very much more restricted.

Similar objections lie against the palatal method, which traverses the septic post-nasal space. Here there is also likely to be some danger of aspiration pneumonia.

The method of approaching the sphenoidal sinuses through the ethmoid by an external incision (Chiari-Kahler) has against it the same theoretical objections that stand against Schloffer's operation; and though Kahler has had some success, it is too early yet to say much in favour of it. It is certainly no better than the median submucous method.

The temporal method has only been found practicable by one operator, who has a considerable mortality, and the records of those cases which have been published do not encourage us to hope much from this route.

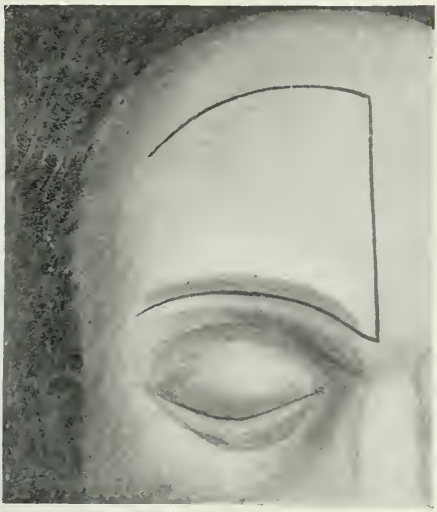
If one is to approach the pituitary fossa through the sphenoidal sinuses, is is clear that the only promising, one could almost say justifiable, method is that of Hirsch and Cushing. Especially in the hands of the latter, who adopts the sublabial incision, this operation has been attended by very little risk of meningitis.

In favour of the fronto-orbital method are the facts that it provides an aseptic route, allows each step of the operation to be performed by the aid of sight, and does not necessitate so much dislocation of the brain as the temporal method. It is true that some œdema of the eyelid occurs after the operation, and that on occasion the eyeball may be left for a time not quite on the same level as the opposite one. This latter drawback should be avoided by care at the time of the operation, though since one is usually dealing with an amaurotic eye, the defect is chiefly cosmetic. The frontal sinus is sometimes in the way; but by previous radiography or transillumination one can estimate its size and avoid it at the time of operation, and if opened it may be temporarily plugged. An additional fact in favour of this method is that the primary enlargement of hypophyseal tumours is towards the brain; the enlarged gland thus presents an easier object for attack by the frontal route.

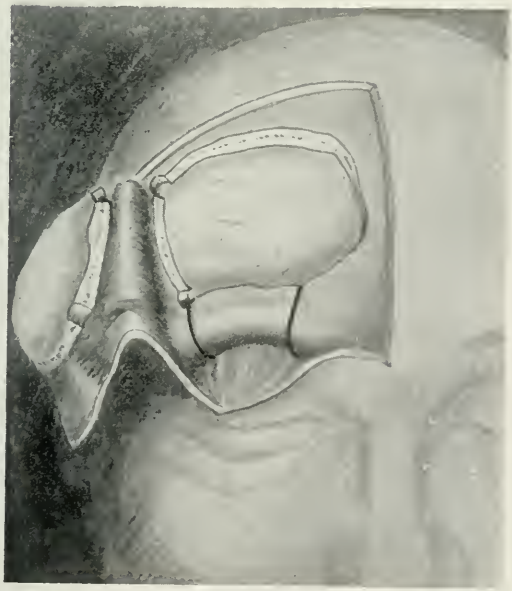
Of course, if the growth is primarily suprasellar, most, if not all, operators would select the intracranial method. It is often difficult to say whether the growth is supra- or intrasellar.

PLATE XIII.

FRAZIER'S FRONTO-ORBITAL OPERATION ON THE PITUITARY FOSSA



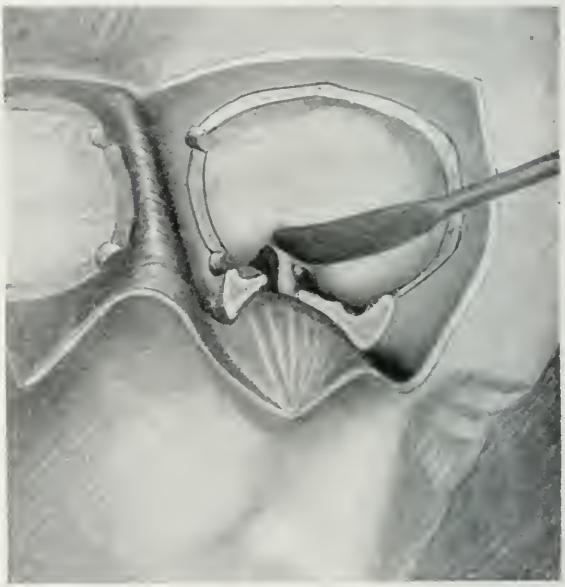
Stage 1.



Stage 2.

PLATE XIV.

FRAZIER'S FRONTO-ORBITAL OPERATION ON THE PITUITARY FOSSA—*continued*



Stage 3.

Illustrations kindly lent by 'The British Journal of Surgery'

PLATE XV.

INTRACRANIAL TELANGIECTASIS

By kind permission of 'The American Journal of the Medical Sciences'

PLATE XVI

OXYCEPHALY

From 'The American Journal of the Medical Sciences.'

"To sum up, we may say that there are two operations which have proved fairly satisfactory for approaching the pituitary fossa—the Hirsch-Cushing submucous nasal method, and the fronto-orbital method of Frazier. Though it is not possible yet to decide finally between these, the opinion can be expressed that the fronto-orbital route is more suitable in the great majority of cases."

Plates XIII, XIV illustrate stages 1, 2, and 3 of Frazier's operation.

E. Sachs[2] reports two cases of intracranial telangiectasis, and discusses the symptomatology and treatment (*Plate XV*). Both cases showed an unusual vascularity: the one of the vessels of the dura, which connected with the pial vessels; the other of the superficial vessels of the cortex.

The limitation of the telangiectasis to the vessels of the leptomeninges is extremely rare. Its occurrence in the dura mater in association with trigeminal nævi has been emphasized by Cushing and other observers. Virchow was the first to differentiate clearly between telangiectases and true angiomata. He drew attention to the point which Adami emphasizes, namely, that a telangiectasis is a congenital dilatation of capillaries without any new-formed blood-vessels, while an angioma is a new growth and only properly so called when new blood-vessels are formed. In some of these cases the process is connected primarily with the capillaries, in some with the veins, and in others with the arteries. In true angiomata, no vessels with all three coats developed are found; but in both of his cases the vessels looked perfectly normal and were well formed. These points are frequently lost sight of, and the term 'angioma racemosum arteriale', or 'venosum,' has been applied to conditions which were not actually new growths. Another point of interest is that these cases are frequently, possibly always, associated with telangiectases elsewhere on the body, particularly on the face. This classification might seem merely of academic interest, but it has a most important bearing on the treatment and prognosis. If this is a true new growth, extirpation is the procedure indicated, while if it is a telangiectasis, ligation should suffice.

The clinical picture is a quite definite one, and is characterized by attacks of Jacksonian epilepsy occurring at long intervals in non-syphilitic young persons; unconsciousness of long duration; no evidence of increased intracranial pressure; a very slow progression of symptoms; and telangiectases on the head or face.

Oxycephaly.—During recent years much interest has been aroused as to the relation of cranial deformities to atrophy of the optic nerve. The two names which have been used most frequently and interchangably in describing this condition, are '*turmschädel*' or 'steeple-skull,' and oxycephaly. William Sharpe,[3] who has considered the operative treatment of this condition, would reserve the term 'turmschädel' or 'steeple-shaped skull' for the mild forms of the condition, where there is no definite prominence or protrusion at the anterior fontanelle, and 'oxycephaly' for the more severe cases, with a prominence at the

anterior fontanelle (*Plate XVI*). Most of the observations of this condition have been made by oculists, since the patients have been brought to them on account of the failing eyesight and nystagmus; very frequently the cranial deformity has been overlooked.

Many theories have been advanced to account both for the cranial deformity and its closely related optic atrophy. Most observers are now agreed that a premature synostosis of the occipital, parietal, and the temporal bones has allowed the brain to grow and expand only in the direction of the anterior part of the skull, producing either the high turmschädel type of skull, or in severe cases, and more rarely, the enlargement and bulging prominence at the anterior fontanelle of the oxycephalic skulls; the resulting increase in the intracranial pressure gradually produces a secondary optic atrophy, very similar to the effect of a brain tumour.

Many opposing views are held as to the pathology. Some regard the premature synostosis as a result of fœtal hyperæmia and inflammation of the meninges due to inherited syphilis or difficult labours; others as a 'dystrophy of rachitic origin,' whereby mild meningitis causes a slight inflammation of the sutures of the skull, and hence stimulates the genetic growth of these bones.

There seems to be no predisposing factor. No race is exempt; about an equal number of blondes and brunettes have been reported. It is far more common in males than in females, the proportion being about five to one. The patients are usually bright and intelligent. If mentally backward, it is usually due to loss of eyesight. There are three cardinal signs of turmschädel, namely, the type of cranial deformity, exophthalmos with divergent strabismus, and impairment of vision. An interesting observation demonstrable by the *x* rays is the remarkable thinning of the bones of the cranial vault, and the formation of 'digital impressions' on their inner surface—due to the pressure of the underlying convolutions. In the oxycephalic type there is a characteristic bulging at the anterior fontanelle, usually covered by a thin layer of bone; it may be as large as a lemon, but in the majority of cases it is noticeable only on palpation. The impairment of vision is always the result of secondary optic atrophy of varying degrees; it is present in practically all cases, and is usually noticed between the second and sixth years of life, progresses to a certain degree, and then ceases. It never produced blindness in adults. The loss of smell is rather frequent. Hearing has been dulled in a number of cases, and occasionally the sense of taste is lost.

The most constant symptom of this type of cranial deformity is severe headache, usually limited to the frontal and occipital regions. As the child grows older, the headaches may cease altogether. It is at this early period that convulsions are likely to appear for the first time, and as the eyesight fails, the 'fits' become more frequent; rarely the convulsions become chronic, and the epileptic 'habit' is acquired.

Any treatment which does not relieve the intracranial pressure is merely palliative, and in order to produce a permanent result, subtemporal **Decompression** is recommended—unilateral or, if necessary, bilateral. This yielded good results in Sharpe's hands, and would probably diminish the danger of progressive optic atrophy.

Fracture of the Skull.—F. A. Besley[4] has contributed to this subject, utilizing the clinical records of 1000 cases observed at the Cook County Hospital, Chicago. The mortality record for this form of injury was 53 per cent. Besley, after a careful study of 74 cases at necropsy, is convinced that fracture of the base is not produced by a bursting force, but is due to a direct inbending force applied through the articulation of the condyles and atlas. He observed repeatedly that the fractures occupy the same position, and are of about the same extent, regardless of location of the injury on the vault. The thinness of the skull through the middle fossa accounts for the frequent fracture at these sites. In all the examinations he has not observed a single fracture of the posterior or occipital fossa that was not a direct continuation of a fracture of the vault. In a few rare injuries, in which the skull is caught between two fixed points, the bursting force is a factor.

From a clinical point of view there is some logic in the classification of skull fractures according to their situation at the base or on the vault, although fracture of the base is much more frequently associated with fracture of the vault than is commonly supposed. In the 74 cases examined at necropsy there were 65 of the base, 63 of the vault, and an association of both types in 54 cases, or 72·9 per cent. The signs of general intracranial pressure produced by bleeding or œdema are manifested by unconsciousness, slow pulse, embarrassed respiration, high blood-pressure, choked disc, and vomiting. The focal signs are entirely dependent on the area of brain that may be involved from laceration or pressure from blood-clot. Signs of compression or focal signs of cortical injury are strongly indicative of skull fracture, but may occur independently of bone injury, being caused by hæmorrhage or laceration of brain tissue.

The free interval of consciousness subsequent to the primary period of unconsciousness and followed by deep unconsciousness indicates a progressive active hæmorrhage and pressure. This most frequently results from injury to the middle meningeal artery, which is rarely involved without an associated fracture.

In fractures of the base, additional evidence is had through free hæmorrhage from ears, nose, mouth, or into the orbital cavity. The escape of cerebrospinal fluid or brain tissue is pathognomonic of fracture. In this series of 1000 cases, blood and spinal fluid from the ears occurred in 316, or 31·5 per cent, bleeding from the right ear in 131, from the left ear in 146, and not stated in 18. Free bleeding from the orbital cavity occurred in 10 cases. Unmixed cerebrospinal fluid from the ears occurred in 21 cases, or 2 per cent. It came from both ears in 3 cases, from the left in 13, and from the

right in 5. Free bleeding occurred from the mouth and nose in 172 cases, from the nose in 118, and from the mouth alone in 53, or a total of 343.

The advisability of making a spinal puncture in all cases of suspected skull fracture is an important question. The procedure, however, is by no means free from danger, especially where there is a marked increase of the intracranial pressure. The danger is that, with the relief of pressure within the spinal canal, the medulla and pons may be forced into the foramen magnum and constricted sufficiently to cause immediate death.

The pupillary changes occurring in 1000 cases were as follows: Dilatation or inequality of the pupils in 19·5 per cent, loss of light reaction in 8·5 per cent, the eye protruded in 9 of the cases. There is no note made of a single case of pulsating exophthalmos. The patellar reflexes were increased in 67 cases, and absent in 50, with no change recorded in the others. A Babinski reflex was observed in 55, and a Kernig sign in 8. General convulsions were noted in 32. Clonic convulsions of the arm occurred in 6, of the leg in 2, and of the face in 7 cases. Rigidity of the legs was observed in 29 cases, and of the neck in 29. Complete muscular paralysis was observed in the muscles of the face in 47 cases, in the muscles of the legs in 55, and in the muscles of the arms in 58.

Vomiting was a common symptom, and occurred in 361, or 36 per cent of all cases. In 11 cases the vomitus consisted almost entirely of blood.

Fibrin as a Hæmostatic.—E. G. Grey[5] suggests the use of **Fibrin** for controlling hæmorrhage in certain types of intracranial surgery. It possesses all the hæmostatic qualities of cotton wet with salt solution, and has the advantage that it is absorbed with comparatively slight reaction on the part of the surrounding tissues. Fibrin is easily procured, it is inexpensive, and it may be kept sterile with the other operating-room supplies. The fibrin from sheep's blood answers most of the requirements, because it is readily procured from the Wassermann laboratory.

After washing the fibrin repeatedly, it is allowed to stand in distilled or tap water for twenty-four hours or longer—until all of the enmeshed red blood-cells have been laked. This brings out the natural white colour of the substance, and prevents it from assuming a muddy appearance during the subsequent sterilization. After placing the fibrin (previously divided into smaller pieces) into a roomy glass jar containing normal salt solution, the mouth of the latter is covered with cotton and gauze and sterilized. The sterilization softens the fibrin, and thus facilitates its absorption by the tissues. It is then ready for use. In this form the fibrin will keep for months.

While fibrin probably exerts no appreciable chemical influence on the process of coagulation, it appears to possess some mechanical property favourable to the formation of a firm clot. The difference between fibrin and cotton in this respect is clearly shown when

pledgets of each material are pressed over bleeding spots and then removed again after a lapse of a minute or two. Fibrin is found to adhere to the underlying structures much more firmly than cotton.

REFERENCES.—[1]*Brit. Jour. Surg.* 1916, July, 107; [2]*Amer. Jour. Med. Sci.* 1915, ii, 565; [3]*Ibid.* 1916, i, 840; [4]*Jour. Amer. Med. Assoc.* 1916, i, 345; [5]*Surg. Gyn. and Obst.* 1915, Oct., 452.

BRAIN, TUMOURS OF. *J. Ramsay Hunt, M.D.*

Interest in cerebellar localization has received an added impetus by the introduction of the Bárány method for testing labyrinthine function and alteration of labyrinthine tonus. Especially is this true of tumours, cysts, abscesses, and other forms of subtentorial lesions. E. G. Grey[1] presents an analysis of the *pointing reaction and caloric tests* in thirty-one cases of cerebellar and extracerebellar tumour from Cushing's surgical clinic. The diagnosis and localization of the lesions were confirmed in all of the cases either at operation or on post-mortem examination. All records have been excluded which showed that the disease had extended into other parts, or which included additional factors likely to confuse the symptom-complex. For purposes of analysis, new growths in the posterior fossa were divided into five groups: tumours of the vermis, tumours occupying one hemisphere, tumours involving most of the cerebellum, cerebellopontine tumours, and extracerebellar tumours lying inferior to the vermis. The pointing reactions and the caloric tests were carried out in the manner described by Bárány.

In the patients with verified cerebellar new growths there were numerous instances in which the reactions varied from one examination to another. The explanation of these variations is probably twofold. Tumours in the posterior fossa rapidly lead to a condition of secondary internal hydrocephalus, with a general increased intracranial tension; and symptoms and signs which might arise from circumscribed cerebellar lesions, in the presence of such an increased pressure, probably undergo considerable alteration and become untrustworthy for diagnostic purposes. In the second place, most of the tumours which directly affect the cerebellum are grossly mutilating in their growth. Great areas are often involved, and anatomical landmarks are effaced. From such an involvement of centres—often rapidly increasing as the tumours spread—we might expect confusing results when functional tests are tried.

The degree of intracranial tension was estimated in each case. For this purpose both the pressure at operation and the swelling of the optic nerve heads were used. It seemed possible that some relationship might exist between the degree of intracranial tension and the nature of the responses. No satisfactory evidence of such a relationship, however, was found.

In the cases reported, the direction of falling was almost invariably independent of the direction of the nystagmus and the position of the head. It likewise appeared to bear no relation to the side of the

lesion. Frequently irrigation of the homolateral ear had no effect on the spontaneous falling, whereas stimulation of the opposite labyrinth resulted in a labyrinthine type of falling.

Bárány and others have found that most of the cases with brain tumour in which there was a considerably increased pressure in the posterior fossa experienced very little subjective discomfort from the caloric tests. The appearance of much dizziness and nausea, and of vomiting, speaks against a process in the posterior fossa. The results from the irrigations reported here entirely agree with these experiences.

In most of the patients having cerebellopontine new growths, and in certain of those with tumours of one or the other hemisphere, the reactions were sufficiently characteristic to be of supplementary value in localizing the disease. In other patients with intra- or extra-cerebellar tumour, on the contrary, the results were often ambiguous and afforded no assistance in establishing a diagnosis. In fact, in numerous instances, the conclusions drawn from these results were at variance with the other physical findings, and, had any great reliance been placed in them, would have led to error.

There are probably a number of factors responsible for the occurrence of atypical reactions in patients with certified cerebellar tumours. The more important are, first, the great increase in intracranial pressure due to an internal hydrocephalus which ultimately accompanies new growths in the posterior fossa; and second, the diffuse nature of many of the tumours common to the cerebellum.

In a subsequent report, Grey[2] considers the question of the occurrence of nystagmus in subtentorial new growths. Practically all authorities agree that nystagmus is a valuable localizing sign in diseases of the posterior cranial fossa. To this category belong especially lesions of the cerebellum the cerebellar peduncles, the vestibular nerves, the neighbouring nuclei, and the labyrinths. When general pressure symptoms suggest the presence of a tumour, nystagmus assumes more importance still, for it is recognized that the occurrence of this sign in a patient with symptoms of subtentorial new growth argues in favour of an extra- or intracerebellar neoplasm. Stewart and Holmes hold that this sign is almost invariably present in every case of cerebellar tumour at one or another time. Occasionally, however, in patients of this type no discernible rhythmic movements of the eyes are found on repeated investigation.

Cerebellar Tumours without Nystagmus.—Of 51 cases of verified subtentorial new growths, there were 11 in which no nystagmus was discernible previous to operation. The lesion concerned in 8 of the cases was a glioma or a gliomatous cyst. In 3 there were tuberculomas, 2 being solitary. The new growths involved practically all portions of the cerebellum. Either the right or left hemisphere was affected as a whole or in part in 6 cases. The tenth and eleventh patients showed an involvement of both the vermis and an entire hemisphere. In the twelfth the lesion affected the deeper, anterior portion of the vermis and the right lobe. It is noteworthy that in no instance was the

cerebellopontine angle primarily involved. The degree of intracranial pressure varied widely among these patients. From a case with no measurable swelling of the optic nerve head and only moderate tension at operation, the pressure ranged to one with advanced choked disc and extreme herniation of the cerebellum into the spinal canal.

Accessory measures for eliciting nystagmus were tried in three of the patients—moving the head as first suggested by Oppenheim, and using opaque spectacles as recommended by Bárány. No success attended any of these tests.

Cerebellar and Extracerebellar Tumours with Nystagmus.—There were 19 verified cases of tumours occupying one or the other of these regions in which nystagmus was present previous to operative treatment. In 22 the new growths were intracerebellar; 10 occupied a median position, while 11 lay in one lateral lobe. In 1 there were gliomatous cysts in both hemispheres. An extracerebellar tumour was found in each of 17 patients. Of these tumours, 13 occupied a unilateral cerebellopontine, and 3 a posterior median position. In one additional case an infiltrating glioma of the vermis lay partially exposed in the posterior median sulcus.

Though the number of cases used in this study was comparatively small, one feature is sufficiently prominent to suggest a generalization, viz., when a patient exhibits a cerebellar tumour syndrome without nystagmus, the absence of rhythmic movements of the eyes points toward an intracerebellar localization of the lesion.

References.—[1]*Amer. Jour. Med. Sci.* 1916, i, 693; [2]*Jour. Amer. Med. Assoc.* 1915, ii, 1341.

BRAIN AND SKULL, GUNSHOT WOUNDS OF. (*See also* Radio-activity *and* Electro-therapeutics.) *J. Ramsay Hunt, M.D.*

Penetrating Wounds of the Skull.

Sargent and Holmes[1] classify these as follows: (1) Tangential wounds, in which the missile, usually a bullet, has passed superficially to the bone, leaving its mark externally in the form of a gutter in the scalp, or of two wounds with a bridge of skin between them. (2) Penetrating wounds, in which the missile has passed immediately beneath the bone, along the chord of a small arc. In these cases laceration of the dura and brain is naturally inevitable. (3) Direct localized blows by fragments of shell or shrapnel bullets which have themselves failed to penetrate the skull, but which nevertheless often drive fragments of bone deeply into the brain, so deeply in fact that even if the ventricle is not actually opened, its proximity to the septic track is such as to render its infection highly probable. (4) Penetrating wounds, in which a missile has entered and remained lodged within the brain substance. (5) Cases in which a rifle bullet has passed across the cranial cavity, the wounds of entry and exit being on opposite sides of the head, or so far apart that the intervening bone is undamaged, or at most only fissured.

Symptoms.—The immediate result of a severe gunshot wound of the head is a group of symptoms due to a widespread disturbance of function affecting in varying degree the whole cerebral and bulbar mechanism: loss of consciousness of varying depth and duration, general muscular flaccidity, and disturbance of cardiac, respiratory, and vasomotor action. Associated with these disturbances we find a group of symptoms due to the abnormal increase of the intracranial pressure. This is the stage of cerebral œdema, and its effects may be aggravated by the presence of effused blood, which either mingles freely with the excessive cerebrospinal fluid, or may be more or less localized or circumscribed. In addition to the symptoms of *general* cerebral disturbance of function, those due to the *local* damage must also be taken into account.

In many respects all these penetrating injuries are alike; they present similar difficulties, are attended by the same dangers, and offer similar problems. Too much stress, therefore, should not be laid upon the fact that in gunshot wounds of the head we are dealing with compound fractures; attention must rather be focussed upon the wound of the brain, in the infliction of which a certain amount of bony damage has of necessity been done.

Treatment.—The time at which operation should be undertaken is a matter of very great importance, and one upon which opinions vary. Two main considerations must be taken into account, namely, the cerebral injury as such, and the presence of an infected wound. As regards the neurological symptoms, operation is rarely, if ever, called for at an early stage, and seldom at a later one. From the point of view of the wound itself, it would naturally seem at first sight that immediate operation would offer the best prospect of recovery and prompt healing; and this would doubtless be true but for two special circumstances: (1) The ease with which the subarachnoid space can be infected; and (2) The tendency which exists towards the formation of a hernia cerebri. Experience has shown that delay minimizes both these dangers.

1. *Meningitis.*—The chief safeguard against a generalized meningeal injection is the formation of adhesions between the edges of the dural wound and the contiguous pia-arachnoid, by which means the subarachnoid space is shut off: this process is assisted by the pressure of the swollen brain against the dural opening.

2. *Hernia Cerebri.*—When the intracranial pressure is raised, and there exists a defect in the skull and dura mater, brain matter tends to be extruded. The tendency is in direct relation to the intracranial pressure, and protrusion is more likely to occur when the brain is manipulated in the presence of the initial traumatic œdema. The appearance of a hernia cerebri is evidence of an abnormal degree of intracranial pressure. As long as this pressure remains stationary, the hernia does not alter in size; any increase at once leads to an enlargement of the hernia, whilst as soon as the pressure falls to normal the protrusion disappears. Further, the lining of the ventricular

cavity tends to herniate, first into the overlying softened brain, and then into the base of the hernia: ultimately it may rupture and discharge cerebrospinal fluid. Ventricular infection rapidly follows. The formation of a hernia cerebri is therefore dangerous not only to life but to function.

The question of the *removal of metallic fragments* is difficult to decide, inasmuch as their ultimate fate and their possible effects upon the surrounding brain are at present uncertain. Such evidence as has accumulated up to the present time seems to show that foreign bodies are best left alone unless they are so superficial as to be removed easily along with the bone fragments; or unless at a later period they cause symptoms directly referable to their presence.

If it is decided not to remove the foreign body, the wound of entrance must nevertheless be dealt with as efficiently, and upon the same lines, as if no foreign body were present. The whole scalp is cleanly shaved, thoroughly rubbed over with gauze dipped in alcohol, and painted with 2 per cent iodine spirit; the wound shares the same treatment. The operation is conducted from start to finish under a rapid stream of hot normal **Saline Solution.** This is an important point, as much softened brain and infective material is washed away, and at the same time the operative field is kept unobscured by blood. The track, having thus been cleansed as thoroughly, and at the same time as gently, as possible, now requires drainage. The tube which they have found, after several experiments, to answer the purpose best, is a cylinder of perforated metal (zinc, aluminium, or copper), $1\frac{3}{4}$ in. long and $\frac{3}{8}$ in. in diameter (an illustration of this tube appeared in last year's MEDICAL ANNUAL). This tube is very carefully inserted into the track, and the flap is replaced and sutured, a small drain of rolled rubber sheeting being inserted between two stitches at each inferior angle. By the time that the flap suture is completed, it is usually found that a certain amount of disintegrated brain has already been squeezed into the tube through the lateral holes. This material is removed by means of a small curette, still under the saline stream. The lumen is then dried out with gauze strips, and filled with sterilized **Glycerin**; finally, a packing of gauze soaked in glycerin is placed around the tube, and a large dressing of gauze and wool is applied. Glycerin has proved to be the best application; it is hygroscopic, it has an inhibitory action upon the growth of pyogenic cocci, and it seems to emulsify and to facilitate the escape of the disintegrated brain substance. If the intracranial pressure is so high that the tube tends to be extruded, a little cerebrospinal fluid is withdrawn by lumbar puncture.

In a certain number of cases foreign bodies were removed by the use of a giant magnet. The instrument is a large **Haab's Magnet,** wound for a voltage of 220, and 8 ampères. The current is switched off and on by the operator's foot. This magnet was made to carry a weight of six hundred pounds, so that its pull, even when greatly diminished by the length of rod used to connect it with the foreign

body, proved to be of ample power. It was found that if the nose of the magnet was brought close to the brain, and the current switched on, the foreign body was not necessarily drawn along the track through which it had entered, but might be pulled along some other, and perhaps more direct, path through uninjured brain. This was clearly a source of danger, to avoid which soft iron rods were used, 12 to 18 cm. long and 1 to 1½ cm. in diameter, for the purpose of connecting the magnet with the foreign body along the track of entrance. It is necessary, before turning on the current, to cover up with towels all the instruments in the area of the wound, or they will fly up to the magnet and disarrange the whole field of operation in a most embarrassing fashion.

Their experience has shown that **Lumbar Puncture** is one of the most valuable aids which we possess in the treatment of gunshot wounds of the head. Firstly, it diminishes the intraeranial pressure in the stage of traumatic œdema when there is any tendency to the formation of cerebral hernia. In the second place, lumbar puncture is made use of for controlling any tendency to hernia formation after operation.

The March and April numbers of the *Lyon Chirurgical* are devoted to cranial surgery of war. Latarjet, Sencert, Delore, Arnaud, Cotte, Tisserand, and Rendu[2] are the collaborators, and the various monographs contain many interesting and unusual illustrations. Their conclusions may be summarized very briefly as follows: (1) All gunshot wounds of the scalp should receive the most careful and minute exploration, even when the wound is small and there are no functional disturbances. (2) If the external table of the skull is normal, trephining should not be performed unless there are definite disturbances of cerebral function. (3) If the internal table is involved, the trephining should include exposure of the dura mater. (4) The operation of trephining should be performed cautiously, and no more bone should be removed than is absolutely necessary. (5) The dura mater should be carefully inspected, and, if perforated, the injured portion should be carefully excised. (6) Lesions of the sinus should be treated by compression, which usually suffices. (7) Cerebral lacerations should be explored with great care, using the finger, and any fragments extracted. (8) It is necessary to drain cerebral lesions with the greatest care, and often for a considerable period of time.

Injuries of the Superior Longitudinal Sinus.

Modern warfare has produced many conditions rarely, if ever, met with in civil life. Among these are injuries of the superior longitudinal sinus, which have been carefully studied by Holmes and Sargent.[3] In gunshot injuries of the head, especially when tangential or superficial, disturbance of the cerebral venous circulation by depression of fragments of the skull is frequent, owing to the superficial course of the cerebral veins, and the fact that their thinner walls

INJURIES OF THE SUPERIOR LONGITUDINAL SINUS

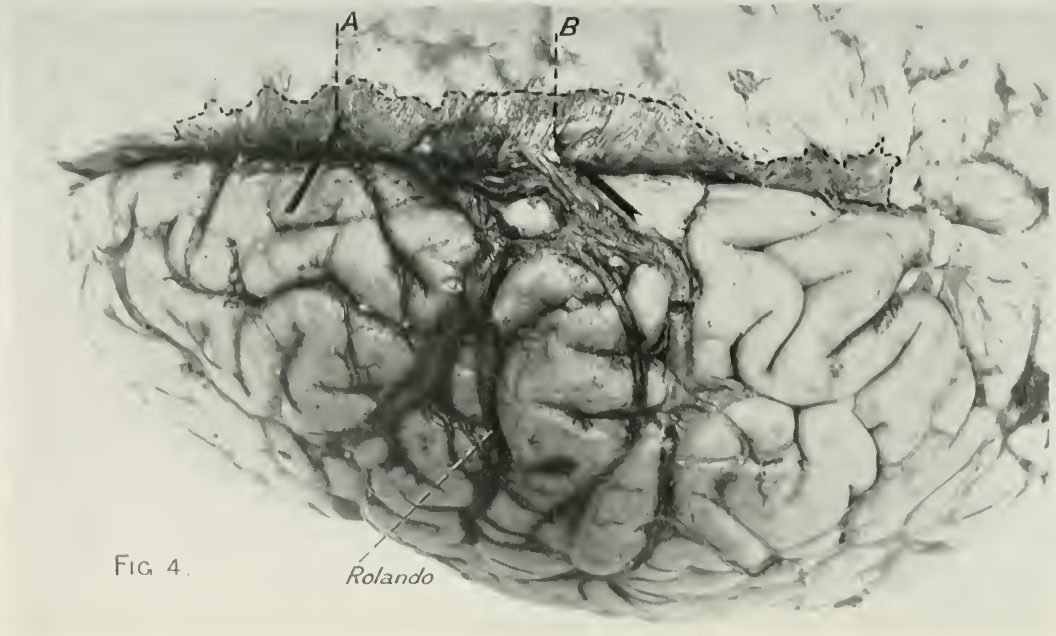


FIG. 4.

Photograph of the left side of a brain with the dura mater thrown back to show its inferior surface and the lateral surface of the left hemisphere. The frontal and parietal lacunæ were not definitely separated, and are both enclosed by a broken line. The longitudinal sinus and the lacunæ were compressed by a depressed fracture between A and B, and the veins which enter it at this region are completely thrombosed. The swollen œdematous condition of the brain in the region of the thrombosed veins is obvious.

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FIG. 5.

Sagittal section of a brain to show the multiple small hæmorrhages into the affected region, a subarachnoid hæmorrhage on its surface, and œdema of both grey and white matter extending backwards behind the fissure of Rolando.

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and the lower pressure of the blood that flows through them make them more liable than the arteries to be blocked by pressure.

The manner in which the superior cerebral veins open into the longitudinal sinus is important in relation to the symptoms produced by lesions in its neighbourhood. Although there is no strict constancy, the superior lateral veins usually unite into four principal trunks—a frontal, a precentral, a post-central, and an occipital; of these, the post-central is usually the largest and, as it drains the central gyri, the most important. As a rule these veins do not open directly into the sinus, but into thin-walled lacunæ that project from it over the lateral as well as over the mesial surface of the hemisphere. A small frontal lacuna receives the frontal vein, a large parietal lacuna the pre- and post-central veins, and an occipital lacuna the occipital vein.

The authors have seen over seventy cases in which the longitudinal sinus was injured or the circulation in its venous tributaries disturbed. The most common type of injury is a gutter or tangential wound at the middle line of the head, which may be either sagittal, coronal, or oblique. The outer table of the skull may or may not be fractured; but the sinus or its lacunæ are compressed or lacerated by depressed fragments of the inner table. On removing the skull-cap post mortem, or on operation, a thrombus was usually found in the longitudinal sinus, its character depending on the duration of the case; but as the sinus is divided up by irregular transverse trabeculæ, and held open by its rigid walls and the support it receives from the dura mater, it is probable that in many cases the thrombus did not occupy its whole lumen. On section there was obviously much œdema of the cortex and subcortical white matter, and minute hæmorrhages, which were grouped more closely in the neighbourhood of the wound. In a few of the cases which came to post-mortem examination, and in others in which the condition could be observed during operation, there were widespread subdural hæmorrhages, which usually formed a thin layer of blood over the convexity, and sometimes extended to the base of the same hemisphere. Many of the superficial veins may be thrombosed, and the rest are much congested. (*See Plates XVII, XVIII*).

The nerve cells in the affected areas show pronounced changes; they are generally swollen and in advanced chromatolysis, the Nissl bodies having disappeared, or being represented merely by irregular clumps at the periphery of the cell. Many cells appear almost homogeneous and hyaline, and often contain an excess of pigment when death did not occur soon after the infliction of the wound.

Motor Symptoms.—The extent of the palsy naturally varies according to the site, severity, and extent of the lesion. "We at present have notes of 20 cases in which all limbs were affected; in 31 both legs and one arm were weak; in 16 only the lower limbs were affected; in 6 the symptoms were mainly hemiplegic; and in 5 one leg alone presented any palsy."

The distribution of the paralysis and its relative severity in different

segments of the limbs is, however, peculiar, and differs from that of the cerebral palsies most commonly seen in civil practice. The hand movements have never remained weak for long, except when the sinus condition has been complicated by an independent injury of the brain. The wrist movements, and especially those of the elbows, are affected more severely and recover less rapidly, while those of the shoulder often suffer when the more distal segments of the limbs escape, and recover much less quickly when the whole limb has been involved.

In this respect the paralysis contrasts strongly with that seen in the ordinary hemiplegia due to vascular lesions, in which the distal segments of the upper limbs are almost invariably more severely affected than the proximal, and recover less rapidly. Further, a definite paresis of the face or tongue is extremely uncommon, and is at the most transient, while speech is never affected in the pure sinus injuries. The trunk muscles may be, however, affected, especially those of the back; the patient is then unable to sit up, and often cannot roll over in bed.

The distribution of the palsy in the legs is the converse of that of the arms: here it is always the distal movements that suffer more severely. This distribution of the paralysis, and its relative severity in the different segments of the limbs, obviously depend upon the arrangement of the cortical motor centres and on that of the cortical veins.

Rigidity.—Even more striking than the unusual distribution of the paralysis is the rigidity which is almost always associated with it. It is generally co-extensive with the paralysis, and closely related to it in its degree. Thus it is always most pronounced in the lower limbs, and, when the upper are also involved, it is greater at the shoulder than at the elbow, and is rarely present and never pronounced in the wrist or the fingers. The early onset of this rigidity is another striking point. The rigidity is often so great that the resistance to passive movement is extreme; it may, for instance, be quite impossible for a man of moderate strength to separate the knees. It is continuous throughout the whole range of any passive movement that is made, and it has never shown any tendency to the 'clasp-knife' type.

Disturbances of Sensation.—The sensory disturbances in these cases are especially interesting, as they are almost always those of a pure cortical lesion unaccompanied by any shock effect. The appreciation of pain and temperature is unaffected, and there is no definite diminution of tactile sensibility, but a certain number of light contacts are not recognized; there is, however, no threshold alteration, and the proportion of those missed is not directly related to the intensity of the stimulus. On the other hand, the localization of tactile stimuli, the recognition of the position and of passive movements of the limbs, and of form, shape, and size, as well as the discrimination of the compass points, may be seriously disturbed. The slightness of the

affection of cutaneous sensibility has frequently been astonishing, as many patients have complained spontaneously of numbness or of having 'no feeling' in their legs.

In certain cases the functions of the bladder were affected. As a rule the functions of the cranial nerves were unaffected, but in several patients the ocular movements were disturbed. In one group there was either temporary weakness or paralysis of the associated conjugate movements of the eyes, without ptosis or affection of the pupils. Fits were observed in ten patients: in two, both sides of the body were involved, but they were limited to one side in the others.

The general symptoms of intracranial pressure have been, as a rule, pronounced. Most of the patients have suffered considerably from headache, and in some it has been particularly severe. In five cases there was also definite optic neuritis, with considerable swelling of the discs.

Treatment.—If the symptoms are due only to compression of the sinus or its lacunæ, the immediate removal of the compressing bone would at first sight appear to be the rational treatment; but experience has shown that the results of surgical interference have been extremely unsatisfactory. Among 39 cases which were operated upon, 15 deaths occurred in the base hospitals, while only 1 among the 37 unoperated upon cases died before transference to England. These figures have not, of course, an absolute value, as it was naturally the most serious cases which were on the whole selected for operation, and in 7 of the fatal ones there was, in addition, some direct injury of the brain. They are, however, sufficient to emphasize the danger of operation. If operation is necessary, it is advisable to remove bone all around the depressed portion, and only then elevate this: for if hæmorrhage occurs, the surgeon is then in a more favourable position to control it.

Nuthall[4] has also observed cases of the longitudinal sinus syndrome, and recommends conservative measures of treatment unless there be hæmorrhage or definite symptoms of compression.

Hernia Cerebri.

S. Smith[5] relates his experiences in the prevention and treatment of fungus cerebri. It is important to limit as far as possible the amount of brain exposed, making wherever feasible the plastic floor, and draining by rubber tubes passed in at the angles of the flap, a procedure introduced by Sargent. It is still more important not to incise the dura if it be found intact, as this procedure involves grave risk of infecting the damaged, but not septic, brain underneath.

It is also important to make use of gravity in the treatment of hernia cerebri, and also in its prevention, and with this end in view, always, when possible, to sit patients up as soon as they are sufficiently recovered from the effects of the operation. This, unfortunately, is not always practicable, but it has a remarkable effect in

limiting the hernia, and will even cause it to subside altogether in many cases. It is also important that, by the free administration of morphine, or similar drug, the patient should be kept quiet, and so prevented from bruising his hernia by knocking it against the head-rail, and for this reason it is well to keep the hernia, if protruding to any extent, surrounded by a sufficiently large 'buffer' of wool to prevent injury.

The importance of proper antisepsis and drainage in the prevention or limitation of hernia cannot be over-estimated. After many experiments, Smith recommends a mixture consisting of equal parts of **Carbolic Lotion** (1–20), **Hydrogen Peroxide** (10 vols.), and water. Various spirit solutions—among them mercury biniodide in spirit, formalin, and even absolute alcohol—were also tried with a view to drying up the excrescence; but although in many cases the hernia itself dried up satisfactorily enough, the general hardening and fixing of its surface produced by the spirit did not allow the septic foci from bone fragments, etc., at any depth to come to the surface; and although the hernia looked clean and shrunken, the patient died frequently from meningitis or cerebritis extending from such bottled-up foci.

The systematic use of **Lumbar Puncture** is of the utmost value. For many months past repeated lumbar puncture has been employed, with the sitting posture as a valuable auxiliary. Although many cases so treated have died, the results on the whole have been more satisfactory than before these two simple and logical lines of treatment came into general use. In some cases a contralateral subtemporal decompression, combined with repeated lumbar puncture, are the only measures holding out any prospect of success.

The character of the cerebrospinal fluid varies. Out of one series of 20 cases with varying degrees of hernia from which cerebrospinal fluid has been drawn, in 5 the fluid was clear (in 2 cases tinged with blood); in 9 it was turbid, containing many polymorphonuclear cells and a few stray pyogenic organisms; in 4 it was frankly purulent (staphylococcus 2 cases, streptococcus 2 cases); in 2 it was purulent, though no organisms grew on culture.

The method of employing lumbar puncture is important. If consciousness is retained, general anæsthesia should be induced, preferably with chloroform. The pressure of the cerebrospinal fluid should first be estimated by means of a manometric apparatus, and it should then be drawn off drop by drop. Not more than four to eight drachms should be removed at one time, owing to the danger of sudden withdrawal of the hernia and infection of the subarachnoid cavity. The interval between the tappings has in most cases been one day. Only in rare instances has daily tapping been found necessary.

References.—[1]*Brit. Jour. Surg.* 1916, Jan., 475; [2]*Lyon Chirurg.* 1916, Mar.-Apr.; [3]*Brit. Med. Jour.* 1915, ii, 493; [4]*Ibid.* 1916, i, 12; [5]*Ibid.* ii, 102. Other references to this subject are: *Lancet*, 1916, i, 1034, 1037; *Lyon Chirurg.* 1916, May-June; *Brit. Med. Jour.* 1915, ii, 498, 501, 747; *Ibid.* 1916, ii, 99; *Presse Méd.* 1916, Feb., 59; *Ibid.* July, 307.

BREAST, SURGERY OF. *W. I. de C. Wheeler, F.R.C.S.I.*

Sarcoma of the breast has been studied by Geist and Wilensky.[1] Fibro-myxo-sarcoma and spindle-cell sarcoma are the most common types. They occur in women at an average age of thirty-nine years. In one case the growth was vastly stimulated by the increased physiological activity of the lactation period. In two cases a history of trauma was obtained, and in three a previous inflammatory condition. The lymph-nodes rarely showed metastatic involvement, although in almost every instance large soft nodes were palpable in the axilla, and occasionally in other regions. The skin and deep parts are rarely involved, and the nipple is rarely retracted. As regards prognosis, the cystic types of tumours seem to be the best. In the solid sarcomata the mortality is as high as 42 per cent. Tumours of the round or spindle-shaped variety offer the least favourable prognosis. On the whole the outlook is better than in carcinomata. The treatment should be radical, the tumour being removed on the lines laid down by Halsted for the radical treatment of carcinoma.

Stewart[2] recommends amputation of the breast by a transverse incision. This permits free exposure, including the subscapular space, and does not run on the arm or through the axilla. The dressing of the wound is simplified, and drainage is not often necessary. The incision is made from a point on the edge of the sternum furthest from the growth and on a level with the nipple, to a point on the same level at the posterior axillary fold, skirting the upper margin of the breast. The skin is well undermined, and the tendon of the pectoralis major severed close to the humerus. The pectoralis minor is cut at its point of insertion. The axilla is dealt with in the orthodox fashion, and an incision afterwards made round the lower margin of the breast, the skin being again well undermined, as far as the lower portion of the costal arch. After operation, the patient is allowed to put the arm into any position she desires.

References.—[1]*Ann. Surg.* 1915, ii, 11; [2]*Ibid.* 250.

BRONCHIECTASIS. *Lewis A. Conner, M.D.*

Yankauer[1] argues the importance of **Bronchoscopy** in every case of bronchiectasis or lung abscess, especially before resorting to any surgical measures. It may be only by this means that the presence of a foreign body in a bronchiectatic cavity can be recognized, and its removal may result in the cure of the cavity. Syphilis may produce changes which result in a bronchiectasis, and should be recognized by the experienced bronchoscopist. Furthermore, it may be possible with the aid of the bronchoscope to determine the extent and the nature of the changes which have taken place in the lungs, and together with the *x* ray it often yields information which renders accurate treatment possible. He has also been able to irrigate bronchiectatic cavities through the bronchoscope under local anæsthesia, a procedure which lessens the amount of secretion and causes the disappearance of the foul odour, at least for a time. None of the cases so treated

have been cured; but they do improve, and in the inoperable cases the method would seem to have a certain very definite value. Such an irrigation may also be indicated before operation. In selected cases it may be possible to bring about marked improvement, if not a cure, by the extirpation of the affected portion of the lung.

H. Lilienthal[2] has devised a technique for the operation that has yielded him much better results than have hitherto been obtained. The preparation before the operation is important. One hour previous, the patient receives a dose of morphine and atropine. Just prior to the administration of the anæsthetic, the thighs, close to the body, are compressed with rubber bandages so as to cut off the venous return, and segregate as much as possible of the blood in the legs. The releasing of the bandages after the operation has much the same effect as a transfusion, and the patient recovers quickly from the narcosis. The incision is the long horizontal intercostal, widened by the use of retractors. The involved portion of the lung is carefully freed of adhesions and from the adjoining lobes. The pedicle is crushed in a powerful clamp and sutured, and the stump cauterized with carbolic acid after the removal of the lobe. If there are no adhesions between the remaining lobes and the chest wall, it is necessary to fix the stump so as to prevent the dangerous so-called 'fluttering' of the mediastinum. Infection is certain, and convalescence stormy. Active exercise is forbidden for several months after operation, and coughing must be subdued with opiates. He has completed the operation six times, and reports four cures. It must be recognized that bilateral chronic infection is a contra-indication to operation, and even in a unilateral condition the process may be too far advanced to permit of any hope of improvement from these means.

Whittemore[3] is able to report but one cure in four cases operated upon by extensive rib resection, but the series of cases is so small that it is hardly fair to base a comparison of the value of the two methods on these reports. Artificial pneumothorax has apparently not been followed by much permanent benefit in the very few cases in which it has been tried.

References.—[1]*N. Y. Med. Jour.* 1916, ciii, 257; [2]*Ann. Surg.* 1916, lxiv, 8; [3]*Boston Med. and Surg. Jour.* 1915, clxxiii, 811.

BRONCHOPNEUMONIA. (*See* Pneumonia in Children.)

BRONCHOSCOPY. *John S. Fraser, M.B., F.R.C.S.*

Removal of Foreign Bodies from the Upper Lobe Bronchus.—Chevalier Jackson[1] says that fortunately the upper lobe bronchus is rarely invaded by foreign bodies. Tracheotomy is of no advantage in these cases. In his clinic there were only four invasions of the upper lobe bronchus in 482 cases. In the first three he succeeded in exposing the foreign body by displacing the spur or 'corner' of the upper lobe bronchus by lateral pressure with the lip of the bronchoscopic tube mouth, the head and neck of the patient being pressed far over and

down toward the opposite shoulder, the axis of bronchoscopic movement being the upper thoracic aperture and not the larynx. This exposed the intruder to view, and rendered removal feasible with the regular 'side-curved' foreign-body forceps. In order to reach 'around the corner,' the author has had a new type of forceps made. As the jaws cannot be seen to close, as is the rule in bronchoscopic foreign-body extraction, their closure should be watched in the double-plane fluoroscope devised by G. W. Grier. Notes of five cases are appended.

REFERENCE.—[1]*Ann. Otol. etc.* 1915, Dec.

BUNIONS. *W. I. de C. Wheeler, F.R.C.S.I.*

On the general principle that pressure causes atrophy and irritation hypertrophy, we may assume that such conditions as corns and bunions are not caused by simple pressure of the boot, but by a combination of pressure and friction, the exposed surfaces gliding backward and forward in an ill-fitting boot. A bunion may be called a painful bursitis superimposed on a hallux valgus. The Mayo operation is more for the relief of the painful bursitis than for the cure of the valgus deformity, although the latter is reduced. Henderson[1] refers to some of these points, and gives interesting details about the anatomy. Bunions are not seen in children or in those who have always gone barefoot. When the great toe is the longest the deformity is often present. Henderson thinks that the wearing of too short a shoe is responsible in most cases for the deformity. It is increased by displacement outwards of the extensor proprius tendon. All cases do not cause inconvenience, and need not be interfered with surgically. Of the various operations, may be mentioned excision of the head of the first metatarsal bone; removal of portion of the head and the bursa; removal of a wedge from the metatarsal just above the head, together with the exostoses: and the Mayo operation.

As the latter is often incorrectly done, Henderson draws attention to the technique. *Fig.* 14, from an *x*-ray photograph, illustrates the amount of the bone removed in the Mayo operation. "The actual technique may be briefly stated: A semilunar incision with the curve upward is made at the metatarsal phalangeal joint of the great toe. The skin is dissected back, being careful not to puncture it. A flap including the bursa is taken with its base attached to the proximal phalanx, and having its convexity extending on to the head of the first metatarsal. The fat is then pushed back from around the head of the bone, and a large bone-biter is introduced from without inward, aiming to take off most of the articulating surface of the head of the metatarsal bone, leaving sufficient of the enlarged end to serve as a weight-bearing portion. This bone-biter is introduced at an angle of about 75°, so that the outer side of the metatarsal bone is a little longer than the inner side after the piece is removed. With a rongeur bone-biter the prominence left on the inner side is smoothed down. The flap is then tucked in, and the base of the flap sewed to the peri-

osteum of the first metatarsal by two mattress sutures of chromic catgut. This serves to straighten the toe and put it in its proper line. The skin is then closed with one or two sutures of silkworm gut, and closer approximation is secured by interrupted horsehair sutures. A pad of gauze is inserted between the great and second toes to straighten the great toe. A dressing soaked with alcohol is applied and carefully bandaged."

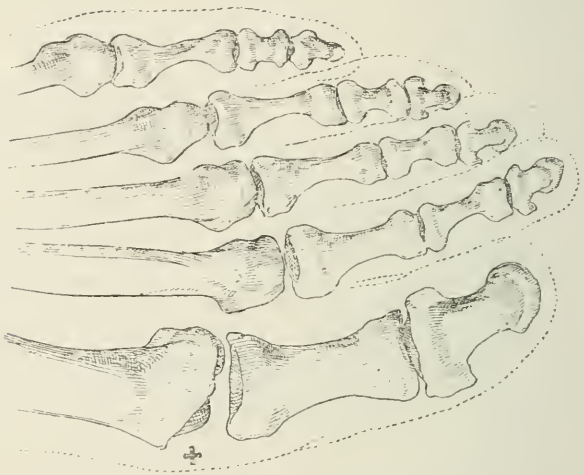


Fig. 14.—Greater part of metatarsal head removed, leaving sufficient of the expansion for weight-bearing, Bone removed here ×.

No splints are necessary. Twice daily the bandage at the end of the great toe is opened enough to allow pouring in of alcohol, thus soaking the dressing and adding greatly to the comfort of the patient. Stitches are removed in a week, weight-bearing permitted in ten days, and the patient encouraged to use the feet as soon as possible. A small pad of gauze or cotton is to be worn between the first and second toes for a few weeks. The wearing of shoes with a proper straight inner side is insisted on.

REFERENCE.—[1]*Jour. Amer. Med. Assoc.* 1915, ii, 1356.

BURNS. *W. I. de C. Wheeler, F.R.C.S.I.*

So far as is possible, the treatment of burns in children should be carried out without dressings and **Exposed to the Air.** Opium in some form is usually necessary for the first twenty-four hours. Burns of the second and third degree crust over and are allowed to remain with pus exuding from under the surface. In time the crust falls off, leaving a reddened healthy surface. This treatment does away with the necessity of frequent painful dressings, which are such a terrible ordeal to a burnt child. Powdering the part with **Boracic Acid** while

exposed to the air has been found effective. Tarnowsky[1] deals with modern treatment, and states that the only chemicals that can still be logically used are those which, while possessing a moderate antiseptic power, are mainly beneficial through their ability to induce local hyperæmia and leucocytosis. He thinks that the use of powerful antiseptics or picric acid is illogical and should be given up.

For a burn of the first degree the first-aid treatment should be simply **Vaseline** and **Gauze.** Afterwards the area beyond the burn is cleansed with ether from grease and dirt. Ether is then sopped over the burned part, and an ointment of equal parts of **Zinc Oxide** and cold cream, to which half a drachm to the ounce of **White Precipitate** ointment is added, is applied. The dressing should be left untouched in the absence of severe pain or a rise in temperature. For fastidious patients a spray of perfume may be applied to the dressings, and in this way frequent change may be avoided. For burns of the upper or lower extremities no dressings are used. The limb is slung by means of gauze bands to a cage, the burned area is dusted over with a powder, and nature does the rest. In private practice this method is seldom feasible ; hence the protective ointment and dressings.

Dressings should be changed as seldom as possible. The layer of gauze next to the burned area should not be removed, but merely covered by fresh pieces of gauze. The ideal after-treatment is skin-grafting, the grafts being covered by thin strips of guttapercha tissue, and then protection of the burned area by means of a wire-netting cage. If dressings must be applied, the gauze covering the guttapercha tissue should be smeared with vaseline.

The following are the points of practical interest in Tarnowsky's paper : (1) Leave burns of the first degree to nature as far as possible ; (2) In burns of the second degree, if grafts are deemed necessary, apply them when shock has abated, even in the presence of pus ; (3) The open-air treatment of burns of all degrees gives the best results ; (4) If dressings must be applied, leave them on as long as possible ; (5) In second and third degree burns, the pain due to exposed tactile bulbs is best minimized by a graft of amniotic membrane or the application of a non-irritating ointment.

For treatment by **Ambrine** (keritherapy) *see p.* 20.

Reference.—[1]*Jour. Cutan. Dis.* 1916, Mar., 191.

BURSITIS. *W. I. de C. Wheeler, F.R.C.S.I.*

Subacromial or subdeltoid bursitis probably never occurs from injury to the bursa alone, but is always associated with fracture, tearing of muscular attachments, and periostitis. Apart from injury, 60 per cent of the cases of subacromial bursitis are of the occupational type. They occur in those whose occupations require certain fixed and limited motion with one or both arms, viz., tailors, cigar-makers, telephone operators, cobblers, etc. Wolf[1] discusses subacromial bursitis, and draws special attention to the acute form of the disease. He finds that sometimes it starts suddenly without known cause,

accompanied by great pain, and the patient is left with a stiff and painful shoulder. The affection must be distinguished from brachial neuritis. Wolf recommends a treatment which he states has never failed him. It consists of **Wet Dressings** kept on day and night, and changed every twelve hours; large doses of **Acetylsalicylic Acid**, and gentle **Massage**. Strictly contra-indicated are hot applications of any description.

It is probable the condition referred to in the above is metastatic—in some cases the origin of the infection is obscure (cryptogenetic). In other cases mentioned by Wolf there was a previous attack of 'grippe' or sore throat, and in one of his patients the bursa also contained pus. The mode of infection is probably exactly analogous to the metastatic infections of joints.[2] There is no reason why the subacromial bursa should not be acutely or chronically inflamed as the result of a severe or mild metastatic infection. It has been clearly shown in the writings of Murphy and others that all non-traumatic inflammations of joints are microbic and metastatic, and this dictum must apply equally to the synovial-lined cavities of bursæ. Wolf probably uses the term acute articular rheumatism in the same sense as metastatic arthritis is now commonly employed.

References.—[1]*N.Y. Med. Jour.* 1916, ii, 217; [2]*Med. Ann.* 1916, 339.

CALCULUS. (*See* Kidney; Prostate; Ureter.)

CANCER. (*See also under various organs, etc.*)

W. I. de C. Wheeler, F.R.C.S.I.

Much work has been done during the past year, and many opinions have been recorded in connection with the possibility of treatment of inoperable malignant tumours. Ionization, seawater injections, and administration of Coley's fluid have their advocates, but the treatment introduced by Beebe, of New York, by a substance called autolysin is at present receiving closer attention in the United States than the results appear to warrant. Details were given in the Medical Annual, 1916, p. 3. It is further discussed by Wood, Jr.,[1] who concludes that in small or large doses it does not affect malignant tumours in mice. A survey of innumerable papers in the American medical journals does not produce a conviction that the appearance of this nebulous extract is producing or likely to produce any appreciable advance in the treatment of inoperable cancer.

Albert Wilson[2] calls attention to the fact that there has always been a great mystery about the blood in malignant disease. "Why, for instance, should cancer remain stationary, or even disappear spontaneously, in one patient, and progress in others? Why should one species of animals be apparently immune to cancer, and why should inoculation of one animal of the same species with cancer give rise to tumour growth, and the same not occur in another?" The injection of goat serum, it is suggested, is not empirical, and Wilson records six cases so treated. In one patient, age 60, suffering from inoperable cancer of the uterus, 6 oz. of serum were procured from a healthy

young goat and injected into the basilic vein. The reaction was severe, but the disease was apparently cured. The patient lived two years and died from an acute disease. All the other cases died, but a remarkable improvement seemed to have been produced in some. Intramuscular injections of ½ oz., ¾ oz., and 1 oz. were given at intervals of a few days, followed by a fourth, fifth, and sixth injection at much longer intervals. This was the method employed in the second case mentioned (villous carcinoma of the bladder).

REFERENCES.—[1]*Jour. Amer. Med. Assoc.* 1916, i, 94; [2]*Brit. Med. Jour.* 1915, i, 155.

CANCRUM ORIS. *Frederick Langmead, M.D., F.R.C.P.*

B. A. Peters[1] records a remarkable case of recovery after the use of **Galyl.** Following measles and bronchopneumonia, the child, a girl age 3, developed a severe form of the disease which led to necrosis of the whole of the premaxilla. After the dead tissue had been removed the destructive process continued, but was checked by the intravenous injection of 6 cgrms. of galyl, a line of demarcation forming between the dead and living tissues within forty-eight hours. Nineteen days later, destruction recurred, and was again arrested by 6 cgrms. of the drug, administered this time intramuscularly. Complete recovery ensued. **Eusol** was used locally throughout the illness.

REFERENCE.—[1]*Brit. Med. Jour.* 1916, i, 719.

CARDIOSPASM. (*See* X-RAY DIAGNOSIS, *p.* 37.)

CEREBRAL HÆMORRHAGE. (*See* BRAIN, SURGERY OF.)

CEREBRAL PARALYSIS DUE TO ARTERIAL SPASM.

J. Ramsay Hunt, M.D.

The occurrence of transient cerebral symptoms resulting from arterial spasm has been recognized for the past thirty years. The earlier writers on this subject, Peabody, Daly, and Bastian, associated it with arteriosclerosis, gout, renal insufficiency, and autogenous poisons circulating in the blood. It is often a forerunner of thrombosis, but this is not always the case, and true examples of spasm are occasionally encountered which exist as such for many years. The condition is closely allied to the intermittent claudication of the extremities (Charcot). Similar seizures are also observed in migraine.

Arterial attacks are favoured by high blood-pressure, emotional excitement, excesses in alcohol and tobacco, and fatigue. There is probably always an underlying organic basis; e.g., arteriosclerosis, syphilis, cardiorenal disease, gout, chronic lead intoxication. The middle cerebral artery is the one most frequently affected, probably because symptoms referable to this distribution, viz., hemiplegia and aphasia, are more alarming and not likely to escape notice. It is, however, not rare to find transitory headache, amnesia, mental confusion, and visual disturbance having the same etiological factors.

J. Gordon Sharp[1] reports an interesting series of cases of transient

aphasia, hemiplegia, and hemiparesis due to arterial spasm. Among the etiological factors noted were arteriosclerosis (one case suffered from arteriosclerotic gangrene of the foot), migraine, excesses in alcohol and tobacco, high blood-pressure, and renal disease. In one case there was an associated angina pectoris.

Treatment.—This should be both preventive and immediate ; and the first is obviously the more important. Alcohol, tobacco, excitement, and vitiated atmospheres are certainly determining causes in those liable, whether or not they be the subjects of arteriosclerosis : therefore they are to be avoided. **Baths,** hot, cold, or medicated, and the liberal use of cold water internally, are useful, for they help to keep clear two important excretory channels. The liberal use of **Purgatives** is indicated, especially of the saline variety (the old-fashioned mistura alba does well). In many cases the occasional addition of 5 gr. of **Potassium Iodide** to the mixture three times a day, and continued for a week or two at a time, may be employed. Where the systolic tension is high, 1 or 2 gr. of **Sodium Citrate** may be given three times a day along with the purgative, and continued for a week or two, for seizures sometimes run a course of rise, decline, and fall, and the course can be cut short by appropriate treatment. Attention to **Diet** is necessary, and it is wise to cut down meat, and in fact all animal protein, and particularly in those beyond middle life. It has been conclusively proved that the urine of large meat-eaters contains a relatively large amount of a body which very markedly raises the blood-pressure when injected into animals, and raising of the blood-pressure is a disturbing element to be avoided.

Reference.—[1]*Lancet*, 1915, ii, 863.

CEREBROSPINAL FEVER. *E. W. Goodall, M.D.*

Though this disease has apparently not been so prevalent during the winter and spring of 1915–16 as during the same seasons of 1914–15, yet the number of cases has been sufficiently great to engage the earnest attention of both the civil and military sanitary authorities, and to afford extended opportunity of studying the disease from every point of view. The most important advances in our knowledge of the subject have been those made by the bacteriologists, because they have a direct bearing on the question of treatment, both remedial and preventive.

Bacteriology.—The variability of the meningococcus has now been quite definitely established, chiefly by the use of agglutination tests. Various strains of meningo- and other cocci are tested with sera of animals (horses and rabbits) immunized against the cocci, and also with sera of human beings suffering from cerebrospinal fever. Both Ellis[1] and Arkwright,[2] working with strains obtained from places scattered over England and Wales, and also from that part of France occupied by British troops, concluded that the prevalent meningococci could be divided into two main groups, identical with the meningococcus and parameningococcus of Dopter,[3] and the meningo-

coccus and pseudomeningococcus of Elser and Huntoon;[4] and an evidently well-informed writer in *Public Health*[5] stated that recent investigation (up to June, 1916) had shown that the prevalent specific organisms could be classed in four main types, of which two were predominant. These two forms, however, would not appear to be the same as those differentiated by Ellis and Arkwright, because the writer referred to above excludes from his four types cocci which exhibit the characteristics of the 'pseudomeningococci.'

Etiology.—The importance of the subject becomes apparent when an attempt is made to answer the question, What is the proportion of carriers amongst contact cases or amongst the population generally? That cerebrospinal fever is spread more by carriers than by actual cases there is every reason to believe. Carriers are of two kinds. The one is the person who has been in contact either with cases of the disease, or with another carrier, and contracts the micro-organism, but not the disease. The coccus inhabits the nasopharynx, and may be passed on to another person in whom it may set up the specific affection. It is curious that not often do carriers themselves develop the disease. Thus H. D. Rolleston[6] states that only 3 of 227 carriers, or 1·3 per cent, themselves fell ill with cerebrospinal fever; and the writer in *Public Health* refers to 3 cases arising amongst 120 carriers —3·3 per cent. The number of contact carriers appears to be very variable according to circumstances—from 7 per cent to 70 per cent (von Lingelsheim and Flügge respectively, quoted by Rolleston). In the outbreaks in the Navy investigated by Rolleston, the number varied from 0·9 to 24 per cent. The other kind of carrier is the person who has recovered from an attack of cerebrospinal fever. As a rule the contact carrier remains positive for three to five weeks only, but he may remain so for any period up to two years. Instances of cases of cerebrospinal fever which could be traced to carriers are mentioned in Rolleston's report (quoted above), p. 376.

Now if the carrier is so potential a source of infection as there are strong reasons for believing him to be, the question of limiting an outbreak of the fever depends largely upon the question of so dealing with the carrier as to prevent him from exerting a harmful influence. It may be stated, *en passant*, that it appears to be undesirable to segregate all contacts, whether they are carriers or not. Warren Crowe[7] found, in one instance at any rate, that the percentage of carriers rose rapidly amongst isolated contacts. Only the carriers should be dealt with. But if the number of carriers is large, as some of the figures already given would seem to indicate, to deal with them adequately would be very difficult if not quite impracticable. Here comes in the value of the bacteriological results referred to above. The cocci found by culturing swabs from the nasopharynx of contacts should be submitted to tests with the serum of the prevailing strain or strains of meningococci (at present four, according to the writer in *Public Health*), and only those who are found to be positive by this method should be detained. The writer just quoted states

that "the agglutination test thus employed shows that of the naso-pharyngeal cocci, which closely resemble meningococci culturally, fully 50 per cent are not of the epidemic type: of 270 agglutinations made of positive contacts of actual cases of cerebrospinal fever, only 120 were found to be of epidemic type. The 150 carriers of the non-epidemic type were liberated, and no evidence of any case of meningitis has arisen therefrom. On the other hand, among the 120 carriers of cocci of epidemic types, 4 have subsequently developed the disease." By careful bacteriological examination, therefore, the number of dangerous contacts can be determined, and it is very much less than the total number of contacts. But even after this reduction it has been found that the number of true carriers greatly exceeds the number of cases of cerebrospinal fever. Thus in a recent outbreak, according to Gordon and Flack,[8] among the contacts of 16 cases 92 carriers were found.

Many attempts have been made to render the carrier free from infection, chiefly by the use of various sprays and douches to the nasopharynx, but also by the use of vaccines. Up to a recent date, however, such measures have not been particularly successful. Yet it has been felt that local treatment *ought* to be successful. The meningococcus is an organism feebly resistant to bactericidal agents; and carriers tend to become more and more free from this organism in the course of a not very prolonged period. Possibly—indeed probably—the most important cause of failure to get rid of the coccus was the difficulty of reaching it in the depths and folds of the mucous membranes of the nasopharynx. Küster[9] appears to have been successful in an outbreak at Cologne early in 1915 by a method which consisted in making the carrier inhale an atmosphere impregnated by a superheated steam-spray with a fluid which liberated **Chlorine.** Recently, after much experimentation, an apparatus has been devised in this country. It is known as the 'Falmouth portable atomizer,' and is fully described by Gordon and Flack.[8] By its means a steam spray is provided, with which is mixed a 1 to 2 per cent solution of **Chloramine.** The carriers are placed in a room of 750 cubic feet capacity. One litre of the solution is sprayed into this space in the course of fifteen to twenty minutes. The carriers remain in the room during the whole of that time, inhaling the air through their nostrils, In thirteen instances chronic carriers were freed from meningococci by daily inhalations, which varied from four to thirteen in the different cases. It is to be hoped that a more extended trial of this apparatus will demonstrate a decided usefulness.

Another question which has engaged the attention of clinicians and epidemiologists is the relationship of cerebrospinal fever to influenza and other diseases which produce a catarrhal inflammation of the nasopharynx. This is discussed by Rolleston, who writes that there is evidence from the outbreaks he studied to suggest a connection between the two; by the Special Advisory Committee of the Medical Research Committee;[10] and by Hamer.[11] From the evidence it

appears that at times cerebrospinal fever, influenza, tonsillitis, and catarrhal affections of the nasopharynx are prevalent at the same time in the same locality, but that the concurrence of outbreaks of these affections is not always to be met with. The premonitory symptoms of cerebrospinal fever are not infrequently indistinguishable from those of influenza and other similar diseases. Hamer, from a study of the historical and epidemiological evidence, concludes that cerebrospinal fever is but a manifestation of influenza, and that the meningococcus is not the true cause of the disease. He is, however, almost alone in this opinion.

Treatment.—The results of **Serum** treatment in the 1914–15 epidemic were very disappointing—so much so that it was abandoned by many physicians. The serums used were Flexner's, Mulford's, Burroughs, Wellcome & Co.'s, and the Lister Institute's; but the bacteriological evidence, in respect of the type of meningococcus met with in the epidemic, which has been mentioned above, led to the introduction of a serum prepared by immunizing horses with the prevalent pathogenic types. No reports dealing with large series of cases treated with this serum are yet to hand; but in a few cases (some of which have come under the writer's observation) good results have been obtained, and it is worth a further trial.

Robb[12] reports recovery in a severe case of cerebrospinal fever with cutaneous and subcutaneous hæmorrhages. Apparently he used Flexner's serum.

Vaccine treatment (with living or dead organisms) has been tried in a considerable number of cases (Bourke, Abrahams, and Rowland,[13] Walker Hall and others[14]). The results were not striking: indeed, the failure of the specific mode of treatment led to a return to the old remedy, viz., frequent withdrawal of cerebrospinal fluid by **Lumbar Puncture,** which appears to have been successful in the hands of Bourke, Abrahams, and Rowland,[13] and Foster.[15] Chartier[16] records two cases in which, having failed to draw off anything but a very small quantity of fluid by lumbar puncture, he was successful in obtaining from 70 to 80 c.c. by puncture in the eighth dorsal interspace.

Bourke and his colleagues, in their paper, draw particular attention to 29 cases which were treated with repeated lumbar puncture combined with the use of living vaccines. The fatality was 45 per cent. In 4 cases they had recourse to decompression, by trephining the skull; the dura mater was opened if it was found to be bulging. One of the cases recovered. In another case the spinal theca was washed out with warm sterile normal saline solution through two needles, one introduced between the second and third lumbar vertebræ, the other between the seventh cervical and first dorsal; but no improvement followed the operation, and the patient died about a month later.

A new method of treatment was adopted in five cases, which all recovered, by Duncan Forbes and Eveline Cohen.[17] It consists in **Raising the Foot of the Bed** on stools or lockers, so that the bed and

the patient's body (no pillow being used) make an angle of 14° to 23° with the floor. "It would appear that a continued raising of the foot of the bed leads to congestion of the cerebral vessels. In mild cases in a few days a normal temperature and free movement of the head result, and the recovery is uninterrupted. In more severe cases the temperature rises and the patient more gradually recovers, the recovery being at first accompanied either or both by increased tension of cerebrospinal fluid and a greater migration of polymorphs." The height to which the foot of the bed is raised varies in each case, and can only be determined by experience. It is best to begin by raising it not too high, and then to increase the height day by day. If the patient's head is retracted so that he cannot lie on his back, the bed should be tilted sideways, and the patient's head allowed to hang over the edge. This position, however, could only be used in the case of children. Lumbar puncture and serum treatment should be used in conjunction with 'congestion.'

Prophylactic Vaccination of contacts and of communities in which cerebrospinal fever has occurred has recently been employed to a limited extent (Treadgold,[18] Major Greenwood, Jun.[19]), but with encouraging results.

For detailed accounts of several of the points dealt with in this review, as well as of many others of less importance, the reader is referred to the Report of the Special Advisory Committee, and also to the Local Government Board's Report on Cerebrospinal Fever. Both can be obtained of the Government publishers.

References.—[1]*Brit. Med. Jour.* 1915, ii, 881; [2]*Ibid.* 885; [3]*Comptes Rend. Soc. de Biol.* 1909, 67; [4]*Jour. Med. Research*, 1909, 20 and 371; [5]*Public Health*, 1916, June, 407; [6]*Jour. Roy. Nav. Med. Service*, 1915, Oct., 373; [7]*Lancet*, 1915, ii, 1127; [8]*Brit. Med. Jour.* 1916, ii, 673; [9]*Deut. med. Woch.* 1915, Sept. 9 (*Brit. Med. Jour.* epit.), 1916, March, 16; [10]*Rep. of Spec. Advis. Com. on Cerebrospinal Fever*, 1916, 42; [11]*Proc. Roy. Soc. Med., Epid Sect.* 1916, Nov. 24; [12]*Pract.* 1916, Jan., 7; [13]*Jour. R.A.M.C.*, 1915, Dec., 633; [14] *Rep. of Spec. Advis. Com.* 62; [15]*Pract.* 1916, Jan., 15; [16]*Rev. de Méd.* 1915, Nov., 585; [17]*Lancet*, 1916, i, 1075; [18]*Rep. of Spec. Advis. Com.* 63; [19]*Proc. Roy. Soc. Med., Epid. Sect.* 1916, Nov., 24.

CERVICAL ADENITIS. (*See* Adenitis, Cervical.)

CHOLERA. *Sir Leonard Rogers, M.D., F.R.C.P.*

D. N. Roberg[1] has investigated the rôle of the minute fly, so common in the Philippines and other tropical countries, *Aphiochæta ferrugiana brunetti*, belonging to the dipterous family phoridæ. They are so small that they pass through a wire screen having sixteen squares to a linear inch. He found that cholera vibrios may be harboured by the insects, when fed on infected media, for ten hours on their body and for twenty-six hours in the intestinal tract, while the vibrios may be transmitted from larvæ through pupæ into emerging imagines. As these flies breed in human fæces, they may thus be a possible carrier of cholera, while their minute size enables them to pass through ordinary fly-proof screens and to enter sanitary pails.

J. S. Coulter[2] has studied the pathological conditions in the gall-bladder in cholera post-mortems, and found the organ to show lesions in 4 per cent. E. D. W. Greig[3] records two cases in which gall-stones were found in the gall-bladder of rabbits which had received a long course of intravenous injections of cholera-like vibrios from water. In a further paper[4] he records an extensive serological investigation of cholera-like vibrio isolated from Calcutta waters, with a view to classifying them. Rabbits were immunized by repeated intravenous injections of each vibrio until their sera agglutinated the vibrio used in a very high dilution. The agglutinating power of other vibrios was then tested with the sera so obtained. He thus obtained six classes of cholera-like vibrios, and found that certain classes were especially frequent in well and tank water respectively, while some where chromogenic. With two exceptions they did not agglutinate with a cholera serum, these two being possibly cholera organisms which had lost some of their typical characters while living outside the body. A. J. Chalmers and N. E. Waterfield[5] describe a para-cholera vibrio from the Sudan similar to one found there in 1896, and discuss at length the classification of vibrios.

L. Rogers[6] records further work on the reduction of the alkalinity of the blood in cholera and the value of **Sodium Bicarbonate** intravenously in the prevention of *post-choleraic uræmia*, based on observations in over a hundred cases. He finds that the alkalinity of the blood is nearly always very much reduced in severe cases of cholera, and that the routine administration of sodium bicarbonate has reduced the death-rate from post-choleraic uræmia to one-fourth of its former rate. S. M. Cox[7] has published an address on the prevention and treatment of cholera based on his experience in China, and describes the apparatus he used for giving continuous intravenous saline.

References.—[1]*Philadel. Jour. Sci.* 1915, Sept., 309; [2]*Ibid.* 1915, Nov., 385; [3]*Ind. Jour. Med. Research*, 1915, Oct., 259; [4]*Ibid.* 1916, Apr., 628; [5]*Jour. Trop. Med.* 1916, July 15, 165; [6]*Ann. Trop. Med. and Par.* 1916, Apr., 139; [7]*Lancet*, 1916, ii, 3.

CHOREA. *Frederick Langmead, M.D., F.R.C.P.*

Walter Timme[1] records a case of a girl, age 8, in which rapid improvement followed **Lumbar Puncture.** The chorea was severe enough to prevent the child from standing or walking, and to necessitate the use of boards around the bed to protect her from falling out. About 8 c.c. of cerebrospinal fluid were withdrawn. Improvement began after a few hours, and within three days the movements had practically disappeared. He quotes Passini, who has recorded five cases treated by this method, three of which were cured. These three had all been acutely affected for several weeks following joint rheumatism, and were free from fever. The fluid was found to be at a fairly high pressure, and was sterile in each case. The cases which failed to improve were of long standing, and the fluid was under no undue tension.

Reference.—[1]*Boston Med. and Surg. Jour.* 1915, ii, 573.

CLAVUS, OR SOFT CORN. *W. I. de C. Wheeler, F.R.C.S.I.*

Henry M. Chase[1] gives an interesting note on the pathology of clavus or soft corn. He modifies the old definition of clavus as representing a small circumscribed horny elevation appearing on the feet, which, bathed in perspiration, became macerated and constituted the so-called soft corn. He points out that it is a painful condition which too often is given to the care of the chiropodist and thought by patients too humiliating to discuss. Chase's conclusions are that clavus, or soft corn, presents on the surface an area of thickened epidermis, moistened and at times macerated by discharge of lymph through an opening in the thickened area. This opening leads through a direct or indirect tortuous channel into the subcutaneous areolar tissue. This lymph-channel may or may not connect with a tendon sheath. It varies in length, according to its tortuous direction, from 1 to 1¼ inches in depth. In none of the cases has it been possible to probe the sinus until the thickened epidermal layer has been removed, owing to the sharp change in direction of the channel.

Treatment.—**Dissection** and **Excision** of the lymph sac. "If wall tears and is too thin to excise, wipe with **Carbolic Acid** and insert small wick for forty-eight hours. Transverse adhesive strapping the entire length of the metatarsals. Keep the toes still. Change gauze dressing as necessary. Lymph secretion may be slight or excessive for several days. Healing by granulation, and permanent cure."

Reference.—[1]*Boston Med. and Surg. Jour.* 1916, ii, 134.

CLINICAL THERMOMETRY. *Herbert French, M.D., F.R.C.P.*

Though much has been learned from the ordinary temperature chart, it is probable that fresh discoveries concerning certain disorders would be made if the patient's temperature could be recorded continuously after the manner of a recording barometer. Many such attempts have been made, and the most recent and promising is that of Sims Woodhead and Varrier-Jones.[1] The original article must be consulted for details. Complicated though the machinery may be, its use, from the patient's point of view is simple: a small thermo-couple is inserted into the rectum, and that is all. Variations in the temperature of the thermo-couple cause changes in its electrical resistance, and this fact is made use of to obtain continuous visible records upon a drum—either photographically or by ink. At present the machine is not likely to be made much use of in ordinary practice, but it is available for the scientific investigation of the clinical thermometry of disease; its authors have brought it to a stage at which it can readily be used by others; and their hope is that scientific investigators will thus help in elucidating numerous clinical thermometrical points which need many workers for their investigation.

Reference.—[1]*Lancet*, 1916, i, 173.

COLDS IN HEAD. (*See* Nose, Diseases of.)

CONJUNCTIVITIS. (*See* Eye, General Therapeutics.)

CONSTIPATION, GERONTAL. *Robert Hutchison, M.D., F.R.C.P.*

By gerontal constipation (Greek Γέρων, an old man) Hollis[1] understands a disorder of the bowels met with in elderly men who are the subjects of enlarged prostate. The prostatic hypertrophy acts in part mechanically, and in part probably by interfering with the normal co-ordinated movements of peristalsis. As a result of the delayed emptying of the bowel its contents become abnormally dry, and this adds to the difficulty of evacuation. In addition to the constipation, such patients often complain of a feeling of distention in the upper rectum, and they frequently suffer from irregularity of the heart and palpitation.

The treatment is medicinal, dietetic, and manipulatory. So far as drugs in general are concerned, it is evident that their action can at best be only palliative. Within these limitations, and as a preventive of a colic block, doses of the aromatic syrup of **Cascara** are very useful. The drug, as is well known, acts principally on the large intestine and empties the rectum. It would seem probable, from the action of this drug, that some constituent of cascara sagrada acts specially on the mesenteric neuromuscular plexus in the colon, and so stimulates the rhythmic movements. The medicine ought to be given in a full dose directly any falling off in quantity or quality of the daily evacuation is observable. The treatment of the senile heart is best effected by small doses of the tincture of **Strophanthus** in a little water to which a few grains of sodium bicarbonate have been added. This mixture may be taken three times daily, about half an hour after a meal.

As regards **Diet,** fruit is of value, and the ordinary rules regarding the modified requirements of the aged man for meats, and the satisfactory mastication of food, should be in all cases carefully observed. Dental hygiene is also very important.

When by daily increasing strain the old man begins to perceive that a visit to his doctor is imperative, much mischief may already have been inflicted upon the mucosa and blood-vessels about the anus. In the treatment of gerontal constipation cleanliness is undoubtedly the most important manipulative procedure. Congested piles, rents in anal mucosa, commencing prolapse, all rapidly yield as a rule to a régime of cleanliness. But in order that the hygienic procedure may produce the maximum effect, it must be started early. When there is much straining at stool, the gerontal right index-finger (well guarded, it may be, with two or three thicknesses of tissue paper) should be pressed upon the perineum just behind the symphysis, and so relieve the abnormal pressure of an enlarged prostate upon the rectum.

Reference.—[1]*Brit. Med. Jour.* 1916, i, 677.

CONTRACTURES. (*See* Adhesions and Contractures.)

CORNS, SOFT. (*See* Clavus.)

CORYZA. (*See* Nose, Diseases of.)

DELIRIUM TREMENS AND DRUG ADDICTION.

Bedford Pierce, M.D., F.R.C.P.

Acute Alcoholic Delirium.—Francis Hare,[1] in dealing with the causation of delirium tremens, points out that in the first place a high degree of tolerance of alcohol is necessary, and this can only be acquired after long years of indulgence. The steady drinker, not necessarily a drunkard, is therefore more likely to succumb to delirium than the man who drinks heavily but paroxysmally. It may occur in persons who have never been obviously the worse for drink. The amount taken varies with the idiosyncrasy of the individual. Some dispose of a bottle of spirits daily without manifest ill effects, whilst others can take but little ; but in each case the condition is the same : the patient cannot do his work, cannot sleep without his accustomed quantity, and as time goes on the quantity tends to increase. If such a person is suddenly deprived of alcohol there is danger of delirium. The danger is the same whether the deprivation is due to abstinence or to gastric or other disease which, by causing vomiting, prevents the absorption of alcohol. This failure to absorb alcohol owing to acute indigestion probably explains the appearance of the delirium in persons who have taken spirits right up to the onset of the attack. The incubation period, i.e., the time after the withdrawal and before the appearance of delirium, is usually short—about three days.

The preventive treatment of delirium tremens really means the treatment of the high degree of tolerance that has been acquired. The first point is to ascertain how much is regularly taken, and most patients are willing to say what is the maximum they can take without signs of intoxication. The minimum required for comfort will not be far from this amount. For twenty-four hours this should be continued, and the first reduction should not exceed two or three ounces in the day. The amount allowed each day should be given uniformly and according to routine. A patient staying in bed can stand a more rapid tapering than one who is taking exercise. In about eight or nine days the alcohol can be entirely stopped. Sedatives are much less likely to be needed when the tapering is gradual. **Bromide** in drachm doses three times a day may be required for two or three days, or an occasional dose of **Veronal** or **Paraldehyde.**

The treatment of vomiting is difficult, as it may be the precursor of delirium. The stomach may be washed out with warm water containing bicarbonate of soda ; but in severe cases, when hallucinations develop, the inhalation of absolute alcohol from an ether inhaler will often supply the want, so that vomiting ceases and the patient sleeps. It is claimed that when such a case is tapered properly there is rarely any difficulty about food, and in two or three days ordinary diet is readily taken.

When an attack of delirium has commenced, it is sometimes possible to cut it short. Alcohol must at first be given freely, and also sedatives, such as paraldehyde, preceded possibly by a small dose of apomorphine. The occurrence of typical epileptiform fits in the

course of treatment need not modify the method adopted, and the same applies to alcoholic albuminuria.

Hare states that at the Norwood Sanatorium the number of cases of delirium tremens has been greatly reduced since the treatment described has been adopted. Before 1907, out of 217 admissions, delirium appeared in 13 cases, or 6·07 per cent. At this time the withdrawal was not sudden, but the amount allowed during the early days of the treatment was six or eight ounces. After 1907, in 1272 patients, only 7 cases of delirium occurred, or 0·55 per cent.

It is necessary to distinguish *mania a potu* from delirium tremens. The former is directly due to the consumption of alcohol by a person who is intolerant, and frequently the attack occurs when quite small quantities have been taken: the latter arises from a sudden withdrawal of the amount to which the nervous system has been accustomed. *Mania a potu* occurs suddenly, without tremor or other warning symptoms, and there is complete absence of fear, which is such a prominent symptom in alcoholic delirium. *Mania a potu* is, moreover, at once aborted by a dose of **Apomorphine** and withdrawal of the alcohol.

Delirium occurs similarly in the course of other drug habits, especially in persons addicted to veronal and chloral. In morphinism the withdrawal can usually be comparatively rapid at first, but much less rapid towards the latter part of the treatment.

Drug Addiction.—McGuire and Lichtenstein[2] give an account of their experience of drug habits in the City Prison, Manhattan. In twelve years the number of cases seen was no less than 12,000, and comprised about 5 per cent of all persons received. The drugs used are principally opium, morphia, heroin, and cocaine. The figures quoted are stated to be a conservative estimate, and they show that drug addiction is extraordinarily common in the large cities in the States. It is a little comfort to Europeans to read that a very small proportion of the cases are recent immigrants.

On inquiry into the commencement of the habit it was rarely attributed to treatment by physicians for insomnia or pain, but the majority of prisoners blame their friends and the existence of temptation. Drug addiction has become so prevalent that there is scarcely a saloon or pool-room that may not be termed a drug-fiends' hang-out. The profit reaped by dealers is enormous, and many are tempted to risk arrest and employ as their agents, janitors, cab-drivers, and bartenders. It is suggested that no law affecting any single State can remove the evil, as it is easy to obtain the drugs from over the border. It is therefore recommended that all purchases for the United States should be made by a central public health authority, which should also control all sales.

The deprivation symptoms appear to be much the same for all derivatives of opium: yawning, lachrymation, sneezing and running at the nose, sometimes itching all over, clammy perspiration, and in bad cases persistent vomiting. Delusions and hallucinations are

not uncommon. As a rule, however, cocaine fiends show no definite withdrawal symptoms; but a combination of cocaine and heroin is particularly destructive to mind and body, and moreover difficult to break off. In treatment, no depressant drugs are permitted. A word of caution is given in respect to 'cures' of all kinds; they are stated to weaken the patient greatly, so that latent disease such as phthisis or nephritis flares up. Rapid reduction of the drug is recommended, with supportive treatment. A patient cannot be cured in two weeks or two months, for after the habit is broken off, the treatment must be continued under favourable social conditions, and the patient should remain away from his old haunts for six months to a year. Treatment in the patient's home is condemned, and institution care is deemed essential to success.

References.—[1]*Clin. Jour.* 1916, Aug., 293; [2]*Med. Rec.* 1916, ii, 185.

DEMENTIA PRÆCOX. *Bedford Pierce, M.D., F.R.C.P.*

David K. Henderson[1] considers that so far nothing trustworthy has been discovered as to the pathology of dementia præcox, and he regards the physical accompaniments as purely secondary phenomena. Cruikshank and Tisdall[2] report a considerable increase in cholesterol in the blood-serum, and suggest that this is correlated to increased activity of the sexual glands and hypertrophy of the suprarenal glands.

Steen[3] points out that many precocious dements adopt a characteristic attitude when sitting, the elbows being held close to the side and the hands in the pronated position on the knees, which are usually close held together. He has named it the 'ancient Egyptian attitude,' as it corresponds closely with the attitude found in many statues of ancient Egyptian kings.

Southard and Canavan[4] quote two cases which suggest the possibility that mental symptoms similar to those in catatonia may be due to lesions of the left angular gyrus. In one case there was a cyst, and in the other a solitary tubercle. In both the disease began late in life—at forty-one and thirty-six years respectively.

With reference to the mental symptoms, Devine,[5] in an article on the biological significance of delusions, discusses the growth of delusional states of mind in a case of paranoid dementia. His position is illustrated by a detailed analysis of a male patient, age 32, who had been in an asylum over four years labouring under delusions of hypnotic influence and of persecution by unseen agencies. Devine holds that "delusional formations fulfil a definite function: they are the expression of certain underlying trends in the individual, and they satisfy certain needs." He referred to the place of day-dreams and reveries in normal life, the tendency to turn away from facts as they exist, and to gratify inner tendencies by seeking refuge in inferior mental operation. Thus, the tired man, after the work of the day, seeks the distraction of the theatre. The biological function of day-dreams "is to afford an escape from reality, to gratify wishes which are impossible of fulfilment under actual conditions of existence."

"Delusional states have, not infrequently, a similar significance. An individual is placed in a situation to which he cannot adapt himself, and he unconsciously seeks refuge in a psychosis, the content of which shows clearly the mechanism of 'wish-fulfilment.'" The case is quoted of an ugly deformed deaf-mute who imagined she was stolen at birth and was really a princess; that her appearance was due to a spell cast by her enemies. She had escaped from the monotony of workhouse life and sought refuge in a psychosis.

In referring to dementia præcox, the view is maintained that ideation is not utterly chaotic and meaningless, and there is no real destruction of mental function, but "the thoughts are turned inward with a corresponding lack of interest in external affairs." The development of this disorder is accounted for as follows: The patient cannot adjust himself to ordinary situations by reason of some fault or defect in his mental make-up, so that delusions appear which relate to intimate personal matters; and, secondly, the inner tendencies which seek to find expression appear in such a distorted fashion that their meaning is far from obvious. "The delusions of dementia præcox are the expression of actual impulses which obtrude themselves indirectly into consciousness." He quotes one of Jung's patients, who said, "I am the double polytechnic irretrievable," meaning "I am the best tailoress." This view is supported by the case in question, which was carefully investigated by word association and free association as advocated by Jung. This patient explained in a cheerful manner that he was tortured by "subconscious force," and his "nature is hypnotized, bestiality and moral agony is forced through him," and that his mind is filled with "Chinese hypnotic supernature." The history of the patient exhibited unfortunate surroundings in early life and the gradual growth of a shy reserved disposition; these led to the establishment of a "shut-in personality," out of which the development to delusions is traced. These in turn display a mechanism of wish-fulfilment. The diffident youth, afraid of responsibility, conscious of incapacity, becomes convinced he is the healer by moral force and possesses the inspiration of perfect efficiency. At the same time his conscious inferiority is attributed to the evil influence of others, so that his real nature is held down by hypnotic influences. Lastly, he believes himself a superior being who alone is able to put right a topsy-turvy world. The conclusion is that the psychosis "is a method of adjustment by means of which the patient attains a state of equilibrium, and compensates himself for a life of conflict and failure."

In this account we see the psycho-analytic method to great advantage; the path followed by the writer is not interrupted by impossible gaps, and the way in which delusional states of mind grow is elucidated. But in this, as in similar investigations by Jung, little light is thrown upon the central problem of dementia præcox—how did it come about that the patient possessed a mind so constituted that it reacted in this way? We learn something as to the manner

in which certain delusions developed, but little as to why the patient failed to adjust himself to external circumstances.

In an article entitled 'Catatonia as a Type of Mental Reaction' David K. Henderson[6] points out the importance of studying the mental characteristics of patients prior to the onset of the psychosis, so that it may be easier to recognize the true nature of the malady. He describes seven patients all presenting catatonic symptoms, e.g., stupor, rigidities, refusal of food, impulsive action. Their clinical features were strikingly similar, and all recovered sufficiently to resume ordinary duties. The first case, however, was clearly manic-depressive in type, whilst the others more closely approached dementia præcox. In judging as to the ultimate prognosis, Henderson dwells upon the importance of ascertaining how far the patient was able to grasp the significance of the break-down, and whether he was capable of combating difficulties which led to it.

His comments on two of the cases illustrate his point of view. "In this case again we see how a man with the shut-in type of make-up, instead of meeting his difficulties in a healthy aggressive way, tended to brood over them, and eventually showed an abnormal type of reaction by relapsing into a catatonic state." "Following her recovery, an attempt was made to review the patient's psychosis, but she was quite content to allow things to remain at a surface level, and adopted the point of view of leaving well alone." "This case, too, like the preceding one, shows clearly how an individual with rather narrow general interests, whose resistance no doubt had been somewhat undermined by a poor state of health, reacted in a faulty way by developing a mute, stuporous condition, which in all persisted for a period of twenty months. Again, however, apparently as a result of her inherently good stuff, a good readjustment was made."

In referring to Shaw Bolton and Devine's opinion that the presence of mental confusion, not of toxic origin, is of grave import, he points out that in five of these cases confusion was present. He implies that no series of symptoms taken by themselves can be trusted to indicate the cases which will eventually deteriorate. The general setting in which the symptoms appear must be studied, and it will frequently be found that the psychosis is the culmination of a long period of mental conflict, and the permanency of the recovery depends on the completeness of the readjustment.

REFERENCES.—[1]*Jour. Ment. Sci.* 1916, July, 571; [2]*Ibid.* Jan., 171; [3]*Ibid.* 179; [4]*Amer. Jour. Insan.* 1916, Jan., 553; [5]*Jour. Ment. Sci.* 1916, Jan., 179; [6]*Jour. Ment. Sci.* 1916, July, 556.

DERMATITIS FACTITIA. *E. Graham Little, M.D., F.R.C.P.*

Gaskell[1] reports a series of cases. He regards the nervous factor as the most important, and considers that the increased frequency of its occurrence is to be explained by the increased and increasing strain of life, and the accentuation by inheritance of the neurotic factor. The recognition of the causation is often extremely difficult, and the most important criteria of differentiation are the very bizarre character

of the lesions, the often sharply linear outlines of the injury, and the disposition on the surface—that of the reach of the most habitually used hand. Mutilation of the face, though much less common than of the covered parts, not infrequently occurs. Stigmata of hysteria, such as anæsthesia of the fauces, absence of other reflexes, frequent nausea and vomiting, wasting, etc., may be associated with the attacks. Sometimes the train of factitious injury may be started by a slight stimulus, as, for example, in one of the cases cited, where dressings of corrosive sublimate prescribed by the medical man for some local affection were used later for producing the lesions.

Treatment consists in protecting the parts of the body attacked by the patient, and Gaskell suggests the somewhat heroic method of applying a dressing of **Sodium Silicate,** the affected area to be wrapped in dry gauze, and the silicate painted on it and left in situ for several days.

Ormsby[2] contributes a series of 35 cases of this affection, and discusses the question whether the patients are conscious of the act or not. Probably there are two groups of cases: some who are actuated by the desire for sympathy or notoriety, or exemption from some disagreeable task, and another class in whom one must assume that the acts are unconscious. In one of the series under review the patient suffered amputation of the fingers, hand, and arm in turn, without desisting from the self-mutilation. The occurrence of spontaneous lesions is maintained by some authorities, but these are a small minority of the cases. The injury may vary from a transient erythema to gangrene; for the cases described under the title of 'zoster gangrenosus atypicus' by Kaposi, and 'dermatitis dysmenorrhœica gangrenosa symmetrica' by some recent Austrian writers, are probably of this causation. The agents employed are very numerous and various, the commonest being phenol, croton oil, cantharides, mustard, various alkalies and acids, tobacco juice, friction with the fingers, and many other means. The characteristics of the lesion are its sharp outline, the sudden appearance, the fantastic shape. It is a moot point whether the practitioner should confront the patient with the charge of self-infliction of the injury. Ormsby favours the plan of persuading the patient to relinquish the acts, and to threaten exposure if the gentler method fails. Of the cases described, 30 were females, and half the patients were under the age of twenty-two. In 12 of the cases some spontaneous injury had started the practice. In 25 recovery was complete; the treatment adopted was as mentioned above—to protect the parts from the patient's own activities, and to treat the dermatitis on general principles.

References.—[1]*N. Y. Med. Jour.* 1916, i, 148; [2]*Jour. Amer. Med. Assoc.* 1915, ii, 1622.

DERMATITIS, TOXIC. *E. Graham Little, M.D., F.R.C.P.*

Bunch[1] remarks that while most of the much-used hair dyes are harmless to the skin (and often ineffective for their purpose), unfortunate results may occasionally occur, perhaps to be explained by

idiosyncrasy or anaphylaxis. Much the most commonly used ingredients of hair dyes are paraphenylenediamine and para-amidophenol, the former for dark tints, the latter for blondes. The staining with these dyes is rapid and thorough. In order to ensure oxidation they are usually mixed ten minutes before use with equal parts of hydrogen peroxide (a practice deprecated by the author). The scalp is then shampooed with soap and water, the mixture of dye and peroxide applied with a brush to the hair, allowed to remain in contact for not more than half an hour, and then the hair is again shampooed; staining of the skin, if it has occurred is removed with vaseline. The second shampoo is important, for, if omitted, dermatitis is much more likely to result. Besides the irritation of the skin which may be produced by these dyes, phenylenediamine in particular may cause more serious absorption effects, indicated by tinnitus, giddiness, clonus, and gastro-intestinal symptoms.

Olson[2] reports a series of five cases of dermatitis due to the wearing of furs stained with paraphenylenediamine, which form an interesting pendant to the above paper. Usually the skin of the 'collar area' of the neck is affected. Occasionally the hands are involved, and in rare instances the dermatitis may extend widely over the body. The first symptom noticed is itching and burning. Following this, in typical cases, there is a marked redness of the skin, accompanied by some swelling or œdema, and intense itching and burning. A rather dry, scaly, scarlatiniform dermatitis is the rule. Occasionally flat vesicles with oozing surfaces are present, but well-marked vesicles and pustules, such as are found in poison-ivy dermatitis, are absent. The severity of the symptoms varies from a small, red, itchy patch, which causes a slight degree of annoyance, to a very severe dermatitis, in which the itching and burning may be sufficient to prevent sleep. In the milder or more chronic cases, there are often formed eczema-like plaques and flat papules. Absorption of large amounts of the dye from the skin may occasion serious internal trouble, such as diarrhœa, vertigo, albuminuria, etc.

The symptoms may not appear for a considerable time after contact with the dye, and it is probable that moisture plays an important part in determining the effect. The dye may be identified by a characteristic brick-red staining of the deeper parts of the fur. Treatment must include the cessation of contact with the fur, and the application of **Zinc Paste** or **Calamine Lotion** to the parts hastens the recovery, which is usually speedy when the irritant is removed.

References.—[1]*Pract.* 1916, ii, 173; [2]*Jour. Amer. Med. Assoc.* 1916, i, 864.

DERMATOMYCOSES. *E. Graham Little, M.D., F.R.C.P.*

Castellani[1] describes an ulcerative condition of hyphomycetic origin which appears to be a new observation. He has noted the disease in Ceylon, the Malay States, and the Balkans. The clinical symptoms are much like those of sporotrichosis, and, like that disease, are often mistaken for syphilis. "In a well-marked case, ulcers are seen

practically all over the body, though on the face, scalp, palms, and soles they are in small numbers or altogether absent. The ulcers are generally sharply defined, roundish or oval, with red granulating fundus. In certain cases there may be abundant purulent secretion, and the ulcers are often covered by thick yellow crusts. Gumma-like nodules and furuncle-like lesions may also be observed. Some of the superficial lymphatic glands are often enlarged. The lesions are not as a rule very painful, and there is little or no itching. The general condition of the patient is not seriously affected for a long time, but he often complains of weakness and general discomfort, and is unfit to attend to his work."

The fungus is not easily found in the scrapings from the lesions, and is best demonstrated by growing material in glucose-agar, in which small amber-coloured colonies appear four to eight days after inoculation. The disease was experimentally reproduced by injecting cultures of the fungus into human beings. Prof. Pinoy, who examined the cultures, regards the fungus as an accladium, which he proposes to call *Accladium castellani*. It has a strong resemblance to some of the trichophytons.

The diagnosis from syphilis is sometimes difficult, and a negative Wassermann, failure to find spirochætes, and complete ineffectiveness of salvarsan and mercury are the usual criteria of differentiation.

Untreated, the disease shows no tendency to spontaneous cure, and may persist indefinitely. Speedy improvement usually results with large doses of **Potassium Iodide,** 20 gr. three or four times a day being recommended. Locally, weak **Perchloride of Mercury** dressings are to be used.

Reference.—[1]*Brit. Med. Jour.* 1916, ii, 436.

DIABETES.

F. D. Boyd, M.D.
John D. Comrie, M.D.

The chief advances during the past year have been along the line of dietetic treatment ; some research has been conducted on the further inquiry into the principles upon which modern treatment is founded, and a good deal of experimental clinical work has been carried out in the actual management of different types of case.

The question of the *protein metabolism* as it modifies treatment has been investigated by Cammidge,[1] who considers that a knowledge of how the bodily tissues deal with protein is of importance only secondary to the information as to how they utilize carbohydrates. It is now common knowledge that the presence of acetone bodies in the urine is an indication that a 'strict diet' cannot be tolerated ; but the occurrence of defects in the utilization of protein is not so well known, mainly because the products of protein metabolism cannot be easily recognized by colour tests as can sugar, acetone, and aceto-acetic acid. This author has devised a comparatively simple method of estimating the percentage of nitrogen in the urine, based on Kjeldahl's method. The urine (1 c.c.) is heated for about half an

hour in a test-tube with sulphuric acid and platinic chloride, thereafter mixed with sodium hydrate solution, and the resultant ammonia absorbed by being drawn through a second tube containing sulphuric acid, and afterwards estimated by titration. Several of these estimations can be carried out at one time. In a healthy individual the total urinary nitrogen is practically equivalent to the amount ingested (very little being excreted in the fæces, sweat, etc.), and there is always a tendency of the body to equalize the intake by increased output, even with wide ranges of diet. In the diabetic, the same point is noticeable, with this difference, that in some cases the increase is apt to be out of proportion to the intake, and remains so even after discontinuance of excessive protein diet. In such a case the patient would tend to lose weight rapidly on a highly protein diet, and, as a matter of fact, this frequently happens. Under these circumstances it is important to reduce the protein intake under the guidance of a daily estimation of the urinary nitrogen till equilibrium is reached. In severe cases where the nitrogenous equilibrium cannot be reached by any other means, the use of **Opium** is recommended by this author.

Joslin[2] has investigated the relations between *pregnancy and diabetes* in about a score of cases. Contrary to the usual idea, he does not regard pregnancy as a necessarily serious complication of diabetes, nor one requiring abortion even when acidosis is present. If the case is carefully observed and treated in the method applicable to uncomplicated diabetes, he does not consider that a patient with diabetes necessarily becomes worse when pregnant. Such cases are probably due to the ingestion of an unregulated quantity of food.

The fatality of *diabetes in childhood* is generally regarded as axiomatic, but Riesman[3] draws attention to a mild type of diabetes in children which has also been described by Frank[4] and Salomon.[5] This type has a familial tendency, occurring in brothers and sisters. The amount of sugar is low—usually under 1 per cent—and the blood-sugar is also about normal. Other symptoms of diabetes are seldom present, and though acetonuria may occur, it is readily controlled by the administration of starchy foods. These cases further appear to belong to the renal type of diabetes, in that the glycosuria is independent of, or hardly at all influenced by, the amount of carbohydrate intake: and the administration by Salomon of even 100 grms. of glucose made little difference to the urine, thus showing a high carbohydrate tolerance. Finally, the disease is not progressive, and may end in complete recovery with the advance of years.

The importance of distinguishing *pseudolævulosuria* (that is, the presence of isoglycuronic acid) is insisted on by Cammidge,[6] because many cases of supposed 'mild diabetes' and rejections of life assurance candidates for 'traces of sugar' are really due to the excretion of pseudolævulose, and are curable by appropriate means. This substance being a protein derivative, the condition of which it is a sign is benefited, not by restriction of carbohydrates, but by reduction or temporary elimination of proteins from the diet. For the recognition

of pseudolævulose in the urine he uses Seliwanow's test as follows: A mixture of 4 c.c. urine with 1 c.c. of the reagent (resorcin 0·5 grm., hydrochloric acid 30 c.c., distilled water 30 c.c.) is heated for a few minutes to boiling point. If pseudolævulose or lævulose is present, the solution assumes a purple-red colour, while dextrose gives no colour reaction. Roger[7] also draws attention to the importance of the presence of glycuronuria in hepatic affections, and advocates the following test: 10 c.c. of urine are mixed with 5 c.c. of saturated acetate of mercury solution; the mixture is filtered, and to 5 c.c. of the filtrate are added $\frac{1}{2}$ c.c. of alcoholic solution of naphtho-resorcin (1 per cent) and 5 c.c. of concentrated hydrochloric acid. After boiling this for fifteen minutes on a water-bath, one cools it quickly under the tap and shakes up with 10 c.c. of ether. If glycuronic acid is present, a violet colour appears.

Blodgett[8] draws attention to the frequency of *acetonuria* in conditions other than diabetes, and especially in the course of the infective fevers. In 44 cases of scarlet fever, 29 had a record of vomiting either before or after admission, and of these, 27 showed acetone in the urine; 15 had no such gastric disturbance, and of these, 13 showed acetone. In 22 cases of diphtheria, 13 had acetone; and in 12 cases of measles, 11 had acetone. He mentions another symptom which he considers of importance in relation to acetonuria, viz., the presence in most cases of a tender area over the pancreatic region; this he found in 50 out of 75 cases of acetonuria.

Frölich[9] records several cases of periodical vomiting in children associated with acetonæmia. Such cases are of not uncommon occurrence, but this writer finds that children who suffer in this way are at all times close to the limit of their digestive capacity for fat. The tendency to vomiting is outgrown at puberty, and it is largely prevented by giving more carbohydrates and restricting fats in the food, together with the regular administration of alkalies.

Woodyatt[10] insists, with regard to acidosis, upon the absence of a sharp line of division between diabetic and non-diabetic states. He regards everyone as a potential diabetic when the rate of glucose supply to the cells is high enough, and states that every case of diabetes passes into the non-diabetic state when it is possible to make the rate of glucose supply to the cells low enough. The difference, therefore, between a total diabetic and a healthy person he regards as purely relative. Similarly, he holds that acidosis in diabetes occurs under the same conditions and conforms to the same general laws which pertain to acidosis in non-diabetic individuals. Thus the limited amount of glucose which the diabetic can oxidize fixes the amount of fat which he can oxidize (that is, about four times as much fat as carbohydrate) without developing acidosis. Thus, in the severer cases of diabetes a rate of fatty-acid metabolism, not greater than what might occur in health, becomes excessive, and so acidosis develops.

In the diagnosis of the approach of coma, the method of examining

the alveolar air for the tension of carbon dioxide is obtaining increased recognition. This means of detecting acidosis is specially advocated by Hornor,[11] who employs Fridericia's apparatus, which he considers very simple and suited for clinical use. For its description and use see MEDICAL ANNUAL for 1916, p. 200.

TREATMENT.—The principal feature has been the further trial and elaboration of the fasting method outlined in the MEDICAL ANNUAL for 1916, p. 203. Joslin[12] gives the record of 211 cases treated by him during the year 1914–15, of whom 55 were fasted, with a mortality of 10 per cent, as against 14 per cent among those treated by other methods. He has formulated a set of rules which may be summarized as follows. **Fast** until sugar-free, giving water freely and one cup of tea and one cup of coffee, if desired; if sugar persists after two days of fasting, add in divided portions 300 c.c. of **Clear Meat Broth.** If acidosis is present, give 0·5 c.c. of **Alcohol** for every kilo of body weight daily until the acidosis disappears; this is best taken in small quantities every three hours. When the urine is sugar-free, add 150 grms. of **Vegetables,** with subsequent gradual daily augmentation, beginning with green vegetables, next passing to onion, squash, turnip, carrot, beet, with **Fruits** like lemon, orange, strawberry, blackberry, gooseberry, peach, pineapple, water-melon; still later to peas, artichokes, beans, with apple, pear, apricot, cherry, raspberry; and last of all to potatoes, rice, and macaroni with plums and bananas. Finally **Oatmeal** and **Bread** are reached unless sugar reappears or the tolerance reaches 3 grms. carbohydrate per kilo of body weight. After the urine has been sugar-free for two days, 3 **Eggs** are added, and thereafter 15 grms. of **Meat** daily till the patient is receiving 1 grm. per kilo of body weight. A small amount of **Fat** is necessarily included in the eggs and meat, and after this daily limit of meat is reached, 25 grms. of fat may be added. The reappearance of sugar demands fasting for twenty-four hours, with a resumption thereafter of the diet at the stage where it was broken off, the carbohydrates, however, being diminished to one-half. Wherever the tolerance for carbohydrate is less than 20 grms., there should be a weekly fast day, and with greater amounts of tolerance there should be a restricted food day on which proportionately diminished amounts of food are allowed. Alimentary rest as the best means of treatment for diabetes was also strongly upheld by the participants in a discussion at the Royal Society of Medicine in May, 1916.[13]

The importance to diabetics of **Exercise** is laid down by Allen,[14] especially after a meal containing carbohydrates. Vigorous exercise for short periods, so far as the strength of patients will allow, is preferable to long, slow walks; during exercise no attempt should be made to shield the patient against cold, excitement, and other invigorating influences.

The use of **Lime Salts** in the treatment of diabetes is advocated by Kahn,[15] on the strength of the fact that calcium phosphate is excreted in more than the normal amount by diabetics, particularly during

acidosis, and also because he has found a negative calcium balance in experiments on diabetic patients. Langdon Brown[16] also believes that coma is obviated by the regular administration, along with alkalies, of **Calcium** and **Magnesium Carbonate.**

Prolonged and accurately-timed intravenous **Injections of Glucose** have been advocated as a therapeutic measure following upon experiments by Woodyatt, Sansum, and Wilder.[17] They found that a man may receive and assimilate over 60 grms. of glucose when administered by vein every hour, and thus nutrition by this means is a possibility. In larger amount and proper concentration, glucose administered in this way is a powerful diuretic, and may prove useful in cases of renal insufficiency, poisoning, etc.

Soya Beans described as a suitable diet for diabetics (*p.* 28).

REFERENCES.—[1]*Lancet*, 1915, ii, 1187 ; [2]*Boston Med. and Surg. Jour.* 1915, ii, 841 ; [3]*Amer. Jour. Med. Sci.* 1916, i, 40 ; [4]*Ther. d. Gegenw.* 1914, 439 ; [5]*Deut. med. Woch.* 1914, 217 ; [6]*Lancet*, 1916, i, 1216 ; [7]*Presse Méd.* 1916, May, 217 ; [8]*Med. Rec.* 1916, i, 645 ; [9]*Jour. Amer. Med. Assoc.* 1916, i, 1498 ; [10]*Ibid.* 1910 ; [11]*Boston Med. and Surg. Jour.* 1916, ii, 147 ; [12]*Amer. Jour. Med. Sci.* 1915, ii, 485 ; [13]*Proc. Roy. Soc. Med.* 1916, June, 63 ; [14]*Boston Med. and Surg. Jour.* 1915, Nov. (quoted in *Ther. Gaz.* 1916, Feb., 120) ; [15]*Med. Rec.* 1915, ii, 744 ; [16]*Med. Rev.* 1916, May, 157 ; [17]*Jour. Amer. Med. Assoc.* 1915, ii. 2067.

DIARRHŒA, BLOODY.

Moszkowski recommends injections of **Iodoform** (*p.* 19).

DIARRHŒA, INFANTILE. *Frederick Langmead, M.D., F.R.C.P.*

An important experimental investigation on this condition has been conducted by E. Mellanby,[1] on the assumption that β-imidazolylethylamine is one of the most important factors in its causation. The substance, a ptomaine and a derivative of histidin, has been recovered from the alimentary canal of normal herbivora by Barger and Dale, and bacilli capable of producing it have been isolated from the intestine of human beings and other animals by Twort and Mellanby. It is capable of producing diarrhœa and vomiting. It was felt that even if some other toxic substance should afterwards prove to be more distinctly implicated, any general rules which could be discovered bearing on the absorption of toxins from the bowel, and the manner in which immunity could be conferred against them, would be relevant. β-imidazolylethylamine, being present in the intestinal mucous membrane of normal animals and capable of causing diarrhœa and vomiting, fall of systemic blood-pressure, depression of the respiratory centre, and coma, i.e., the symptoms met with in epidemic diarrhœa and vomiting, is a toxin whose action is especially worthy of study.

Certain indications for treatment emerge from this investigation. The body fluids should be increased to normal by intravenous injection of **Saline** whenever possible. If this is impracticable, saline should be given subcutaneously. As soon as it can be retained, water (2 oz. every hour) should be given by the mouth until vomiting ceases. When saline is given subcutaneously, he recommends a con-

tinuous injection from a thermos flask. The danger of producing œdema of the lungs he believes to be exaggerated, unless bronchopneumonia is present. Sea-water has no special advantages.

Feeding should start as soon as possible, but not before the body fluids have been brought to normal. Speaking theoretically, he suggests as a suitable food a solution of 10 per cent dextrose made up with 0·5 per cent of HCl. If this is retained, it may be replaced by a solution of whey containing a large proportion of lactose, and afterwards by diluted milk. He disapproves of giving albumen-water in an early or severe stage of the disease, because of the decomposition changes it is liable to undergo in the absence of a secretion of proteolytic juices and hydrochloric acid.

Concerning purgatives, it is clear that if magnesium sulphate is to cause any beneficial action it must be given in fairly large doses, sufficient to produce a concentration in the intestine of above 2 per cent. Since fats delay the absorption of toxic bodies from the bowel, castor oil ought to be useful, and if its fats are absorbed, their high calorie value must be advantageous. Morphine should be used only to suppress the symptoms, diarrhœa and vomiting; it is dangerous if toxæmia is severe.

From a study of 222 dispensary infants, A. Bleyer[2] demonstrates the direct relationship between *heat* and summer diarrhœa. Over one-half (51·4 per cent) of the babies became ill when the temperature was 90° F., although there were but 31 per cent of such days in the two summers during which the cases occurred. Most of the babies were rationally fed, 30 being exclusively and 22 partially breast-fed, whilst many of the remainder received certified milk. Most of them were overburdened with clothes.

Among the forms of fermentative diarrhœa in infants, L. W. Hill[3] considers that due to excessive decomposition of carbohydrates to be the commonest, its three principal causes being too high a sugar percentage in the food, too much food at a time, and bad milk. For its treatment, albumen-milk is particularly valuable, but difficult of preparation. He recommends as a substitute skim-milk dilutions, with the addition of powdered casein. He adds sufficient calcium casein to the dilution to bring the protein content up to 2·6 per cent for a baby under six months, and 3 per cent for a baby over six months. When the diarrhœa has ceased, whole milk is added to raise the fat proportion, and later, if all goes well, malt sugar is also gradually added until the carbohydrates form 3·5 per cent. He advises no drugs unless there are very frequent stools with painful defæcation, when **Opium** may be given. He dislikes the much-used initial dose of castor oil.

From a study of 75 cases of infectious diarrhœa, C. T. Broeck and F. G. Norbury[4] come to the conclusion that the infecting organism is the dysentery bacillus. It was recovered from the stools in 51 instances, and in 5 others it was obtained by post-mortem cultures. Of the remainder, 9 out of 14 reacted positively to agglutination

tests. In all cases the bacilli belonged to the mannite-fermenting group. Great numbers of the organisms were recovered from the mucosa of the cæcum. They could obtain no evidence that the *Bacillus welchii* is ever a cause of the disorder.

Arnold advises the administration of **Sodium Sulphate** (*p.* 28).

References.—[1]*Quart. Jour. Med.* 1916, Apr., 165; [2]*Jour. Amer. Med. Assoc.* 1915, ii, 2161; [3]*Boston Med. and Surg. Jour.* 1916, Apr.; [4]*Ibid.* 1916, i, 785.

DIPHTHERIA. *E. W. Goodall, M.D.*

In the United States a considerable amount of work has been done during the past year or so as to the value of the **Schick Test** for immunity against diphtheria. It may be called to mind that this test consists in injecting into the skin one-fiftieth of the minimal dose lethal for a guinea-pig of about 300 grms. weight. Within thirty-six to forty-eight hours, redness, swelling, itching, and slight infiltration of the skin occur. Very occasionally a vesicle forms. G. H. Weaver and B. Rappaport[1] have introduced a slight modification of the technique. "The skin on the outer side of the arm is rendered tense by clasping the arm from behind. The needle is first thrust into the skin at right angles to the surface to the depth of about $\frac{1}{8}$ in. The direction of the needle is then changed so, that if it were carried forward it would emerge about $\frac{1}{2}$ in. from the point of entrance. The needle is then carried forward in this direction until the point is plainly visible within the epidermis. The injection is then made and the needle withdrawn. The advantages of this method over the old one are that it is less painful, requires less time, and the danger of any escape of fluid from the puncture is obviated. The toxin has always been so diluted that one-fiftieth minimal lethal dose was contained in 0·1 c.c. The test injection has been made on the outer side of the right arm, and at a corresponding point on the left arm a control injection was made, consisting of the same amount of toxin plus several hundred times the amount of antitoxin required to neutralize the toxin. The mixture was so made that the amount injected was here also 0·1 c.c. The actual quantity of serum injected was from 0·003 to 0·005 c.c. of an antitoxin-globulin solution."

Fresh dilutions of toxins must be made every four to six weeks, and should be kept in a refrigerator. The toxin-antitoxin mixtures for the control tests should be freshly prepared every few days.

The authors record the results of the test in a considerable number of cases (about 750), and found them to be much the same as those recorded by other observers; about 50 per cent of the persons tested gave negative results (see Medical Annual, 1916, p. 207). So far as they go, the figures show that the older the person tested, the more likely is the test to be negative, i.e., the person to be immune to diphtheria. It was found that in a few instances a positive reaction was followed by antitoxin production. In three cases in which persons gave positive reactions, negative ones were given a few months later.

The authors observed several points of interest in respect of the

control toxin-antitoxin injections. "Since the toxin is here neutralized, an entire absence of reaction is usually associated with a positive reaction in the test arm. A pseudo-reaction is usually associated with a similar one in the control. A pseudo-reaction in both arms sometimes subsides in two or three days, leaving a typical reaction in the test arm which runs a typical course. The control injections sometimes cause reactions which have no counterpart in the test arm, and are due to the serum injected. In persons who are hypersensitive to horse serum, a local reaction develops at the seat of injection. This usually appears within twenty-four hours, and consists of a bright redness, swelling, and slight pain on manipulation."

J. Zuckerman[2] has published the results of a number of observations made with the view of determining the length of passive and active immunity. To ascertain the former, small groups of children were immunized with antitoxin varying in strength from 500 to 5000 units. All these children had been found previously to react positively to the Schick test. It was found that usually the test, negative soon after the antitoxin injection, became positive again in one to four weeks. When this occurred, the children were re-injected with antitoxin, but they became positive to the Schick test again in nine days to five weeks. Eight were injected a third time with antitoxin; six of them certainly showed a positive Schick test in about two to four weeks. The results go to show that passive immunity is variable in its duration, and that at the best the period is comparatively short. Further, repeated injections of antitoxin have no cumulative effect as regards immunization.

Active immunization was induced by injections of toxin-antitoxin mixtures which were slightly toxic to guinea-pigs. Observations were made in seven cases. Four injections were given over a period of nine weeks, at intervals of two, four, and three weeks respectively. Frequent Schick tests were made, and it was found that fourteen weeks after the first injection of the toxin-antitoxin mixtures, four children still gave a negative Schick test.

From the observations recorded, it would appear that active immunity conferred in the manner stated is of longer duration than the passive immunity conferred by antitoxin alone. The number of cases observed is, however, too small to allow of a decided statement. The author concludes: "From the administrative standpoint the Schick test has rendered marked service. The fact that it is necessary for us to immunize only cases giving a positive reaction has many points of advantage: the saving of antitoxin, the doing away with the labour involved in inoculating an entire ward of children, the prevention of more or less marked anaphylactic reactions. But, further than that, it has replaced to some extent the isolating room for diphtheria. In a large institution, diphtheria is constantly making its appearance in the course of the winter, and in most asylums the problem of providing isolation, with the expense involved, is a difficult and ever-recurring one. This winter, using the Schick as a guide and

criterion, we have placed diphtheria carriers among children who gave a negative skin test, and in no instance has infection resulted." (These remarks apply to an infant asylum containing about 500 children.)

W. H. Park and A. Zingher[3] also report on the results of immunization with a toxin-antitoxin mixture. These researches have led them to the following conclusions :—

1. Individuals who, before treatment, give a negative Schick reaction, are immune probably for life, and therefore it is not necessary to inject them, when exposed, either with antitoxin or toxin-antitoxin.

2. Those who give a positive Schick reaction and are exposed to diphtheria and in immediate danger, should receive either antitoxin alone or, if a longer protection is desired, both antitoxin and toxin-antitoxin.

3. For the general prophylaxis against diphtheria in schools and communities, excluding immediate contacts, a mixture of toxin-antitoxin alone (from 85 to 90 per cent of the L+ dose of toxin to each unit of antitoxin), or toxin-antitoxin plus vaccine of killed diphtheria bacilli, is recommended. The dose is 1 c.c. of toxin-antitoxin and 1000 million bacteria injected subcutaneously and repeated three times at intervals of six or seven days. Sufficient time has not as yet elapsed to judge the value of adding the injections of the bacilli to the toxin-antitoxin.

4. The early and the late results of active immunization should be determined with the Schick test. Early results are those obtained by the application of the test within four weeks, and late results from four months to two years after the immunizing injections.

References.—[1]*Jour. Amer. Med. Assoc.* 1916, i, 1448 ; [2]*N. Y. Med. Jour.* 1915, ii, 808 ; [3]*Jour. Amer. Med. Assoc.* 1915, ii, 2216.

Herbert French, M.D., F.R.C.P.

Arneth's Count.—The polymorphonuclear cells in the blood, when examined in stained films, present varying numbers of lobes in their nuclei. Arneth was one of the first to draw attention to the fact that the relative numbers of these lobes was not the same in health as in disease. He made differential counts of the polymorphonuclear cells, according to the number of lobes present in the nucleus of each, classifying them as follows : Class I, with unsegmented nucleus ; Class II, with two lobes in the nucleus ; Class III, with three lobes ; Class IV, with four ; Class V, with five or more lobes. On this basis he found that in health the 'Arneth count,' as it has been termed, is approximately as follows :—

Table I.—*Showing Arneth's Percentage of Leucocytes, arranged according to Number of Nuclear Segments in Normal Blood.*

	Class I	Class II	Class III	Class IV	Class V
Normal	5	35	41	17	2 per cent.

He found that cases of pulmonary tuberculosis in particular showed departures from the normal, the more serious the case the greater being the number of polymorphonuclear cells with few lobes. This is described as a 'movement of the Arneth count to the left,' as shown by the following cases :—

TABLE II.—*Pulmonary Tuberculosis, showing an Increase in the Percentage of Polymorphs with one or two Nuclear Divisions, and Decrease of those with more Divisions.*

PULMONARY TUBERCULOSIS	Class I	Class II	Class III	Class IV	Class V
Case 1 ..	18	64	17	1	0
„ 2 ..	10	53	25	12	0
„ 3 ..	18	46	22	10	4
„ 4 ..	31	57	10	2	0

F. E. Taylor[1] has collected various observations upon the Arneth count in different infective conditions, and the following tables show that the movement to the left occurs much more in *general* infections than when the infections are *local*.

TABLE III.—*Showing the Number of Nuclear Segments in the Leucocytes in Certain General Infections.*

DISEASES	LEUCOCYTES				
	Class I	Class II	Class III	Class IV	Class V
Typhoid fever	47	33	20	0	0
Scarlet fever	34	38	26	2	0
Measles ..	51	30	19	0	0
Diphtheria ..	40	35	24	1	0

TABLE IV.—*Showing the Number of Nuclear Segments in the Leucocytes in Certain Localized Infections.*

DISEASES	LEUCOCYTES				
	Class I	Class II	Class III	Class IV	Class V
Gonorrhœa ..	19	32	36	12	1
Laryngeal tuberculosis ..	16	36	38	9	1
Tuberculous conjunctivitis	9	45	38	8	0
Mild oral sepsis	26	38	30	6	0

His paper deals with other aspects of the subject also. One conclusion that he draws, if it is borne out by the observations of others, is of particular importance ; it is that a marked movement of the Arneth count to the left in cases of diphtheria appears to augur a very grave prognosis, which he exemplifies by the following cases :—

TABLE V.—*Diphtheria ending in Recovery after the Administration of Anti-diphtheritic Serum.*

	Class I	Class II	Class III	Class IV	Class V
End 1st week	23	70	7	0	0
,, 2nd ,,	38	57	14	1	0
,, 3rd ,,	34	49	16	0	1
,, 4th ,,	12	63	21	3	1
,, 5th ,,(rash)	24	58	17	1	0
,, 6th ,,	9	56	29	10	0

TABLE VI.—*Three Fatal Cases of Diphtheria.*

	Class I	Class II	Class III	Class IV	Class V
Case 1, 2nd day (death)	65	28	7	0	0
,, 2, 2nd ,, ,,	65	27	7	1	0
,, 3, 3rd ,, ,,	49	49	2	0	0

REFERENCE.—[1]*Pract.* 1915, Oct., 503.

DRUG HABITS. (*See* DELIRIUM TREMENS AND DRUG ADDICTION.)

DUODENAL ULCER, SURGERY OF. (*See also* GASTRIC AND DUODENAL ULCER ; STOMACH, SURGERY OF ; *also* X-RAY DIAGNOSIS.)

E. Wyllys Andrews, M.D., F.A.C.S. (*Chicago*).

There has recently been a marked tendency to advise pyloric exclusion in all cases of *gastric and duodenal ulcer*, whether for bleeding or stenosis. Gibson, of New York, recommends obstruction of the pylorus by a subperitoneal section across its lumen. The mucous coat, having been dissected, is divided and ligated in two places, after which the peritoneum is closed across it.

Bland-Sutton refers to the growth of our knowledge of ulcers, old and new, both duodenal and jejunal. He shows that peptic ulcer may form in the jejunal loop after gastrojejunostomy. This is a complication difficult to control, but fortunately of rare occurrence. Pylorectomy, in his opinion, may be superior to gastrojejunostomy. If the pylorus is obstructed, the results are good ; but when patent, the chyme flows through it and ignores the new route. This can be proved by the fluoroscopic examination. For this reason he has been more successful with pyloric resection.

The rôle of gastro-enterostomy in the treatment of ulcers is discussed by Martin and Carroll, of Baltimore, who find that many disappointments have followed that operation from the want of permanence of the cure. They have found recurrence in at least 45 per cent, and quite a large percentage have become malignant. They ask if there is not a more lasting means of cure, and conclude that pylorectomy is a more rational procedure. The greatest success of this method is illustrated by a series of skiagrams before and after operation.

Gustaf Petren, of the University of Lund, Sweden, discusses the retroperitoneal perforation of duodenal ulcer. He states that 95 per cent of these ulcers are in the first part of the duodenum. Perforation here results in peritonitis; a small number are perforated further down in the vertical or the horizontal part. Here a perforation posteriorly causes inflammation in the retroperitoneal tissues. This leads to diffuse phlegmonous processes posteriorly, which are not easily relieved by laparotomy. Four cases of this type are reported in the writer's paper.

Richard Warren, in the *Lancet*, discusses the perforation in gastric and duodenal ulcers in a report of 40 cases. Of these, 29 were men and 11 women. All were operated upon and 26 recovered, a mortality of 35 per cent. The problem is also discussed of adding jejunostomy or gastrojejunostomy. The effect of either of these procedures is to relieve the stomach of much irritation in the post-operative treatment.

References.—*Lancet*, 1916, i, 272; *Ann. Surg.* 1916, i, 414, 423.

DYSENTERY, AMŒBIC. (*See* Amœbiasis.)

DYSENTERY, BACILLARY. *Sir Leonard Rogers, M.D., F.R.C.P.*

The war conditions do not appear to have led to the occurrence of any serious epidemics of bacillary dysentery, probably owing to improved sanitation. A. Castellani,[1] and independently J. P. Johnson and A. J. Milne,[2] have advocated prophylactic inoculation with sensitized **Shiga Vaccine** at the same time that typhoid inoculations are carried out. Unsensitized dysentery vaccines are too toxic to be used safely on a large scale. G. C. Low[3] has written a general account of bacillary dysentery, and advises the usual treatment with **Serums** and **Salines**. At a conference of a large number of medical officers at Alexandria,[4] the serum treatment of bacillary dysentery with from 30 to 40 c.c. daily was advocated by several speakers, the first dose being preferably given intravenously in bad cases; but the results were uncertain, although very favourable in some cases. If collapse ensued, saline injections were of use. Oppenheimer gave from 50 to 100 c.c. of serum for the first dose, followed by 40 c.c. on alternate days. He also found hypertonic salines given intravenously very beneficial in collapse cases. R. Ross[5] saw a fair number of cases of bacillary dysentery in Egypt. Salines were useful in the early stage, but of doubtful benefit in chronic cases. The serum treatment gave uncertain results, bacteriological diagnosis not often being feasible.

Deék's treatment with large doses of **Bismuth** was useful in chronic cases. He mentions that A. H. Lister used subcutaneous infusion of hypertonic saline, together with 10 min. of a 1–1000 **Adrenalin** hypodermically, every four hours, with very good results. **Opium** was invaluable throughout. L. Rogers[6] records a series of cases of chronic bacillary dysentery treated by sensitized Shiga and Flexner vaccines made by him ; he found them to cause no toxic symptoms, while a great majority of very chronic cases were much benefited or cured by the treatment, which promises well.

J. C. G. Ledingham[7] has investigated the value of serological tests in dysentery convalescents. He finds the upper limit of agglutination of normal bloods with Shiga's bacillus not to exceed "50 (+) 100 (trace)" ; while of 103 convalescents, the great majority with a history of dysentery, 47·5 per cent gave a higher agglutination with Shiga's bacillus, and he concludes that they had suffered from bacillary dysentery. T. R. Ritchie[8] has tested the agglutination of normal sera with the bacilli of the typhoid-dysentery group, and concludes that with typhoid and paratyphoid A and B. complete agglutination in a dilution of 1–32 or over is diagnostic, but with Shiga's bacillus it should be 1–64, and with Flexner over 1–128.

P. L. Sutherland[9] records a case of Shiga bacillary dysentery contracted in England.

G. M. Van Poole[10] describes a dysentery outbreak at Hawaii with three cases due to the 'Y' bacillus. H. Fraser[11] has made a careful study of bacillary dysentery in the Malay States, where mannite-fermenting organisms were found to be much more frequent than the Shiga type. He concludes that the sugar-fermentation tests are unreliable for subdividing the mannite ferment into 'Y,' Hiss and Russell and Strong's organisms, which are not distinct types, so that these names should disappear from the literature. The serum of patients from whose stools dysentery bacilli have been isolated may give no serum reaction. The disease associated with the mannite-fermenting bacilli does not differ from that due to Shiga bacillus ; therefore the term is unnecessary.

G. Boudet[12] describes an epidemic of bacillary dysentery among troops in Morocco, and advocates the serum treatment in acute cases, beginning with not less than 40 c.c.

H. R. Dean and R. S. Adamson[13] have been experimenting with a view to obtaining a non-toxic dysentery vaccine. They found that the toxicity of the Shiga organism is enormously reduced or entirely destroyed by the action of a dilute solution of **Eusol** or **Hydrogen Peroxide**, and that such non-toxic emulsions, when injected into animals, produce a satisfactory degree of immunity.

References.—[1]*Brit. Med. Jour.* 1916, i, 306 ; [2]*S. Afric. Med. Rec.* 1915, Dec. 24, 372 ; [3]*Pract.* 1916, May, 570 ; [4]*Brit. Med. Jour.* 1916, i, 142 ; [5]*Lancet*, 1916, i, 1 ; [6]*Brit. Med. Jour.* 1916, i, 7 ; [7]*Ibid.* 47 ; [8]*Lancet*, 1916, i, 1257 ; [9]*Brit. Med. Jour.* 1916, ii, 142 ; [10]*The Military Surg.* 1916, May, 525 ; [11]*Studies from Inst. Med. Research Malay States*, 13, 1916 ; [12]*Presse Méd.* 1916, June, 281 ; [13]*Brit. Med. Jour.* 1916, i, 611.

DYSKERATOSIS LENTICULARIS ET DISCOIDES.

E. Graham Little, M.D., F.R.C.P.

Bowen's paper[1] deserves full study in the original, for it is probable that we have to do with a new disease, named by Darier 'dyskératose lenticulaire et en disques,' and is regarded by that high authority as an affection apart, resembling Paget's disease and, like that, often terminating in malignant disease.

Bowen has collected six cases in all since his first publication on the subject : in 1912, three of his own, and three recorded by Darier. "From a study of these six cases, it will be seen that the affection is of an eminently chronic nature. In two of the cases the beginning dated back nineteen and thirty years respectively. Four of the cases were in males, two in females. It may apparently attack any portion of the integument, and begins as a firm papule, pale red or nearly of the colour of the normal skin. This papule is covered by a thickened horny layer, which may become excessive, and usually is combined with a serous exudation to form a cornified crust. These papules increase to form lenticular, or rounded, nodular lesions, which may remain discrete, or often tend to become grouped or confluent. When the crust is removed, the surface beneath is found to be red and oozing, granular, and sometimes slightly papillomatous in appearance. In one of the cases, rounded or irregular, sharply bounded, scaling or atrophic-looking, non-indurated patches were observed, which showed histologically the same structure as the typical crusted nodules. Excision or complete destruction of the lesions, with a resultant cicatrix, seems to be the only cure. Radical treatment is further indicated by the fact that a cancerous transformation has been observed in three of the six cases."

The condition is very liable to be mistaken for a tertiary syphilis, and in fact two of Bowen's cases were so regarded by competent dermatologists. The diagnosis is established by histological investigation as definitely as is the diagnosis of the other types grouped under the term dyskeratosis, viz., Paget's disease, Darier's psorospermosis, and molluscum contagiosum. These diseases have the common factor of a vitiated evolution of the epidermic cell, which results in the formation of round bodies, at first regarded as protozoal, but now generally accepted as an imperfectly keratinized Malpighian cell.

In two of Bowen's cases freezing with **Carbon-dioxide Snow** was adopted, with a satisfactory result, and in the third the lesion was excised. Darier's cases were treated either with **Radiotherapy** or with **Superheated Air.** Recurrence and malignant evolution followed, however, in three of the six cases noted.

Reference.—[1]*Jour. Cutan. Dis.* 1915, 787.

DYSMENORRHŒA.

Emetine recommended by W. Beresford Robinson (*p.* 17).

EAR, DISEASES OF. (*See also* Ear, Syphilis of; Throat and Ear. War Neuroses of.) *John S. Fraser, M.B., F.R.C.S.*

Blackwell[1] has been impressed by the large number of acute infections of the external auditory canal, middle ear, and mastoid bone, as well as by the acute exacerbations of chronic suppurative otitis media, caused by *sea-bathing*, frequently necessitating operative treatment, and sometimes resulting in serious intracranial complications.

All patients coming under any of the following classifications should be warned against sea-bathing without first submitting to an aural examination: (1) Those having had suppuration from one or both ears; (2) Those with discharging ears; (3) The deaf; (4) Individuals who complain of itching in the external auditory canals. In the majority of instances the ear infection takes place by way of the Eustachian tube.

In making an aural examination one should look specifically for the following conditions: (1) Acute, subacute, or chronic suppuration of the middle ear; (2) Partial or complete destruction of the drumhead caused by previous suppuration; (3) Eczema of the external meatus. If any of these conditions are present, the patient should be instructed to place a well-fitting plug of lamb's wool in the external auditory canal before entering the water. Absorbent cotton is useless for this purpose, and even the non-absorbent variety is unsatisfactory. A rubber bathing-cap, fitted over the head and ears, will serve to hold the wool in position. The patient should be cautioned against diving, and be told to keep the head out of water as much as possible. Immediately on leaving the bath the plug of wool should be removed from the canal, and the concha wiped dry. The canal can be thoroughly dried by tightly twisting a bit of absorbent cotton about the square end of a match and inserting it carefully within the canal for about half an inch, then rotating it gently.

Crops of otitic furuncles are frequently observed in persons accustomed to taking daily surf-baths. A good preventive measure consists in placing a few drops of glycerin or a small portion of vaseline in the canal. This will protect the epithelial lining. Furuncles in the canal are best treated by hot irrigations in the early stage, combined with wet dressing. When the swelling points, an incision should be made so that the pus may be evacuated.

The catarrhal inflammation of the middle ear, which usually produces the sensation of water in the ear, stuffiness, tinnitus, deafness, etc., frequently develops immediately after leaving the water; but while it may be a source of much discomfort to the patient, it is not attended by any definite pain. The treatment consists in hot irrigations of saline to the drum and topical applications to the tube, and, in some instances, gentle inflation of the tympanum and free catharsis. Should an earache develop and the membrana tympani lose its landmarks and its lustre, and finally bulge, an immediate myringotomy under general anæsthesia is very strongly indicated.

Finally, patients with chronic discharge from the middle ear (as indi-

cated by the foul odour of the pus and the presence of granulations in the fundus of the canal), who, as a result of sea-bathing, develop a diminution, suppression, or increase of the discharge, associated with earache, headache, insomnia, or mastoid tenderness, should be carefully observed and treated, as these conditions are apt to be serious, and frequently require operative procedure for their relief.

Cauliflower Ear, or hæmatoma auris, is met with in boxers, football-players, and among the insane. Palmer[2] recommends the following treatment. After preparing the ear and plugging the external meatus with cotton, he makes an incision under local anæsthesia into the hæmorrhagic cavity, slightly below the prominent part of the swelling. All clots should be removed with a curette. The incision is now closed, except for a small opening which will just admit the end of a Eustachian catheter, connected through a waste-bottle with a small Pynchon pump which rapidly removes the accumulated blood. The suction approximates the loose layer of skin and perichondrium to the cartilage. A generous coating of sterile petrolatum is now applied over both surfaces of the ear and the adjacent skin of the face and

Fig. 15.—Appearance of the ear three weeks after injury.

Fig. 16.—Appearance of the ear after operation.

scalp. The mould, coated with petrolatum, is now placed about the ear, and half a tumblerful of plaster-of-Paris cream, prepared by an assistant, is poured into it, completely surrounding the ear. The ear is now completely encased in the plaster, with the Eustachian catheter still inside the wound, and the pump working continuously. As the plaster hardens, a slight rotary motion of the catheter permits of its easy withdrawal through the cast, and establishes a permanent drain to the wound for the escape of any newly-formed fluid. The cast is removed by fragmentation with dental forceps ten days later. In old organized cases, Palmer makes a mould carved from plaster-of-Paris to represent the normal ear, and also a die with dentist's modelling wax. After removal of the foreign substance, when the ear is perfectly soft and pliable, he forces the die down on the anterior surface of the ear and then encases the whole in plaster-of-Paris. (*See Figs.* 15, 16, and *Plates XIX, XX*)

Otitis Media.—Emerson[3] believes that acute otitis media is the most frequently overlooked affection of infancy and childhood. Where it

PLATE XIX.

CAULIFLOWER EAR

Re-drawn from 'The Journal of the American Medical Association'

Fig. A.—Ready for operation, with points of injection for anæsthesia and proposed incision indicated.

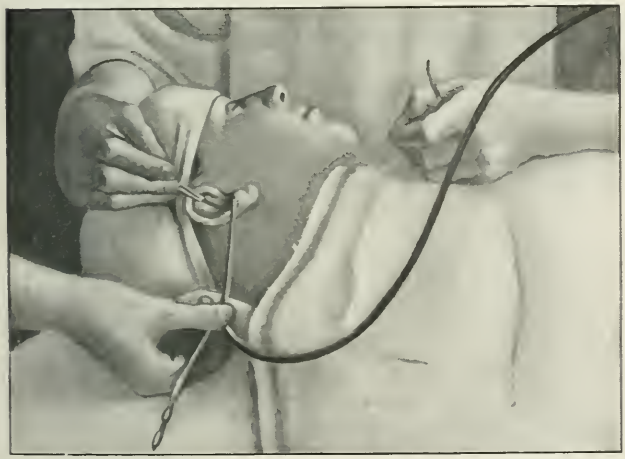


Fig. B.—Approximating the skin and perichondrium to the cartilage by negative pressure.

Fig. C.—Plaster cast held firmly against the head with adhesive plaster. Probe in the drainage hole left by withdrawing the catheter.

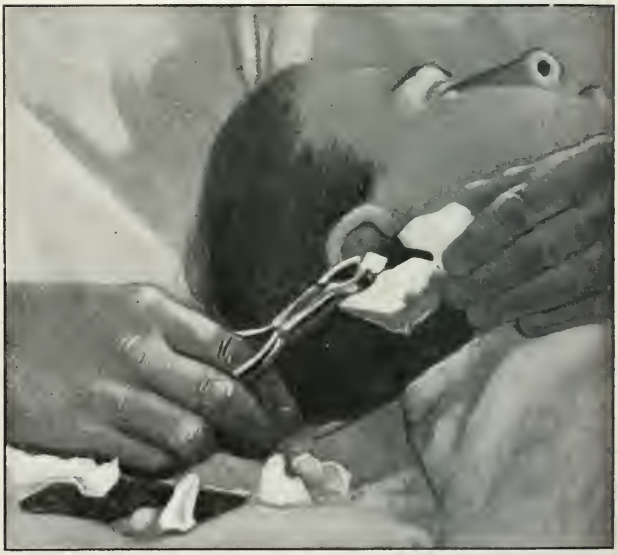


Fig. D.—Removal of the cast by fragmentation, dental forceps making a very satisfactory tool.

occurs as a complication, the symptoms are obscured by the general toxæmia. In none of the five cases recorded by Emerson were there symptoms of earache. In two cases the symptoms were all abdominal, in one meningeal, and in two general, associated with fever. The diagnosis was made by examination of the ear-drums. In three cases where the drumheads were opened promptly the symptoms subsided in twenty-four hours. When there was delay, discharge continued for more than two weeks. Four of the five cases had a double otitis. In 2000 cases of scarlatina, measles, and diphtheria, otitis media was clinically diagnosed in less than 15 per cent ; but in 252 fatal cases otitis media was present in 92 per cent. There were 59 cases of mastoiditis, of which only 8 were recognized during life—80 per cent of these showed œdema of the brain. An examination of the ear-drums on admission to hospital, and additional examinations made only when there are symptoms of otitis, are not sufficient. In infectious diseases and in all diseases of the respiratory tract the ears should be examined at every visit with as much reason as the heart in rheumatism or the abdomen in typhoid fever. Emerson recommends electric ear instruments that have a light inside the speculum, so that an untrained person is able to get a clear picture without disturbing the child.

By way of prevention, two or three drops of a 10 per cent solution of **Argyrol** may be introduced into each nostril three times a day. In older children, the use of the following ointment applied inside the nostril protects the congested turbinates :—

℞	Menthol Eucalyptol	āā gr. vij	Lanolini Vaselini	℥vj ℥ij

If the drum membrane begins to show congestion, four drops of adrenalin solution 1–5000 and cocaine 15 per cent should be allowed to flow through the nostril on the affected side. [The following drops should be instilled into the affected ear (or ears) from a warmed teaspoon :—

℞	Cocainæ Hydrochlor. Acid. Carbol.	gr. iv gr. vj	Glycerinum	ad ℥ij

J. S. F.].

If the symptoms increase, the drum should be incised without waiting for bulging or pus. In infants, etherization is not necessary ; but in older children, enough ether should be given to allow time for a careful and accurate incision. [Ethyl chloride as a general anæsthetic is quite effective.—J. S. F.].

Lund[4] states that *albuminuria* occurs in 3 per cent of cases of otitis or its complications. The nephritis does not become chronic, and the duration of the otitis media is not lengthened by the albuminuria ; but if the kidney trouble occurs in the course of otitic meningitis it is of bad omen.

Adam[5] states that the clinical picture due to infection with Vincent's organism is such that by simply looking at an ear thus infected one

can say '*Vincent's infection*.' The characteristic clinical picture may be summed up as follows: chronicity, fœtor, blood-stained discharge, erosion of meatus and external canal, thin greyish membrane, bleeding granulations. Adam remarks that the disease is one due to gross neglect, and seems to be engrafted on a prior infection. Other organisms are always found, chiefly streptococci, and less frequently staphylococci and coliform or diphtheroid bacilli. Adam emphasizes the fact that this spirochætal infection of the middle ear and external canal is not uncommon.

Morrison Coates[6] remarks that any unchecked discharge of over six weeks' duration belongs to the chronic class. No untoward result, except one mentioned later, was observed in the treatment by **Vaccines** of 200 acute and subacute cases, necessitating over 1000 injections. All discharge is removed from the canal by gentle swabbing or by suction, and the canal and drumhead sterilized with 90 per cent alcohol. Pus is now forced out by tympanic inflation or aspirated with the suction otoscope, and a small portion transferred with a platinum loop to an agar slant. Nagle advises incubating the cultures till the height of the growth is reached, when it is washed off with normal saline solution, sterilized, and counted. Coates prefers to plate out the different organisms found, subculture them, and, if desirable, make the mixture afterwards. For an adult, about 500 million of the staphylococcus, *B. pyocyaneus* (or diphtheroid organisms), and 30 to 50 million of the other organisms, are used for the initial dose. This is reduced to about a sixth for a child under three, and increased for the varying ages in proportion. The injection is made beneath the skin, after sterilizing with alcohol: this is better than iodine, because it does not obscure the local reaction, which is used as a guide for the succeeding doses. These are given every three or four days. Anaphylactic reactions have not been observed. In a case that responds favourably we expect to get, following the first dose, and occasionally the second, a local areola, 2 to 4 inches, appearing in from ten to fifteen hours and lasting as long as forty-eight, accompanied by some slight induration and tenderness. A general reaction may be obtained, consisting in slight fever, headache, possibly chilly sensations, and lassitude, for a few hours. The aural discharge usually increases at first, then becomes thinner, and may cease altogether. Home-made laboratory stock vaccines may be substituted for the autogenous product where available, providing the infecting organisms can be determined. Coates also claims good results from commercial mixed vaccine, usually called 'mixed catarrhal.' If improvement does not follow in a few days, an autogenous culture must be made. Whatever method is used, it seems to be the best practice to give one or two injections of the maximum dose after the ear has become dry, in order to insure permanency.

Many of the chronic cases are intermittent in type and are dry for long intervals. In the presence of extensive bony necrosis or cholesteatoma, we cannot expect favourable results without opera-

tion. There is often much contamination, and it is difficult to pick out the causative organism. Coates states that in a series of 46 cases, 39 dry ears were obtained by the use of commercial mixed vaccines. In another series of 28 cases selected under the same conditions, in which autogenous vaccines were used, dry ears that appeared to be permanent were secured in but little over 40 per cent. Cases that were not doing well, on being re-cultured frequently showed a change in the organism obtained. In some of the most successful cases *B. pyocyaneus* was present.

The one untoward result observed was in a patient who had foul discharging ears of many years' duration, an eczematous condition of the meatus, and an enormous infiltration of the auricles. The infecting organism was a streptococcus. The vaccine was not sterile, and the patient promptly developed an abscess at the site of the injection. The abscess healed, and so also did one of the ears. The eczema and induration entirely disappeared.

It is Coates's habit, on finding pus in the mastoid, to have a vaccine prepared and held in readiness, should convalescence be unduly prolonged.

Mastoiditis.—Amberg[7] reports a case in which the diagnosis between furunculosis and mastoiditis was very difficult until the röntgenologist reported the mastoid intact. Under gas anæsthesia Amberg liberated a teaspoonful of pus, and the patient promptly recovered. The writer also records several cases of acute suppurative otitis media with slight tenderness over the mastoid, in which *x*-ray examination showed a healthy mastoid, and in consequence operation was not performed. In addition, Amberg mentions cases in which the radiogram showed that operation was advisable, and in which the operative findings confirmed this view.

Radical Mastoid Operation.—Fraser, with many other otologists, begins the radical operation by making a semicircular incision in the hair margin, because the line of incision then lies over the posterior part of the mastoid process. The flap is dissected forward subcutaneously till the retro-auricular groove is reached, when an incision is made through the periosteum down to the bone. Thus a valvular wound is obtained. The nearer the otologist can get to the gouge, or chisel, of the stonemasons the better. Fraser considers the Vienna pattern of gouge to be the nearest approach. This is so made that the operator, with the aid of his left thumb, can prevent it from slipping when the wooden hammer is applied. After the bridge has been removed, the facial spur is very freely shaved down with a large gouge. Stacke's protector is never used. In many cases it is advisable to level down the convexity on the floor of the bony meatus so as to give good access to the tympanum in after-treatment. The external wall of the attic and aditus should also be freely removed. Fraser has found that the lower end of the long process of the incus is usually absent in cases which come to the radical mastoid operation. The plastic operation on the membranous external meatus may be

performed at almost any period of the operation. Fraser uses either Koerner's oblong flap or Neumann's Y flap. He believes that the inner tympanic wall should be left alone as much as possible, unless a polypus be present. In removing a polypus it is most important not to scrape away the epidermis covering the anterior and inferior walls of the bony meatus, in order to avoid subsequent narrowing of the meatus at the isthmus. The Eustachian tube is a great difficulty. In Fraser's experience there is a large class of cases of chronic suppurative otitis media, with oval perforations in the anterior part of the drumhead, or kidney-shaped perforations below the umbo, in which the suppurative process is confined to the anterior or tubal portion of the middle-ear cleft and the lower part of the tympanic cavity. These cases are really 'tuborrhœas,' and the hearing power is usually very good. If the surgeon performs the modified radical operation in such cases on account of the good hearing, a healthy antrum is found. If he goes on to complete the radical operation so as to get good access to the Eustachian tube and tubal portion of the tympanic cavity, he will find a large tube which is exceedingly difficult to close, even with the aid of Alexander's rectangular curettes. Fraser points out that the modified radical operation is inadvisable in cases of chronic middle-ear suppuration, in which the continuity of the ossicular chain is broken, nor in cases with anterior or central perforations associated with 'tuborrhœa.' He remarks that the only class of case in which the modified radical operation appears to be of advantage is a comparatively small one, viz., cases of 'attic' perforation with good hearing.

In operation on cases complicated by cholesteatoma, Fraser does not as a rule remove the matrix. It is necessary to impress on all patients on whom the radical operation has been performed that they must have their 'operated' ear attended to at least once a fortnight, and better still once a week, for the rest of their lives.

It is very important to make a large external auditory meatus. If the meatus be too small, the cavity tends to remain moist. There is not infrequently a tendency to drooping of the auricle after the radical mastoid operation. To obviate this he removes a crescentic piece of skin at the upper and posterior part of the curved retro-auricular incision. The area removed is about 1 in. long and $\frac{1}{4}$ in. wide at its broadest part. Unless a Thiersch skin-graft is applied to the bony cavity at the end of the operation, it is not unusual to find, within two or three weeks, an exuberant growth of granulations from above and from below in the region of the cut edges of the posterior bony meatal wall. This is especially seen in cases in which the bone is very vascular.

Skin Grafting at the Time of the Radical Operation.—In order to disinfect the cavity made by the radical mastoid operation, and to check the bleeding, Marriage[9] pours into it hydrogen peroxide (20 vols.) and leaves this in the cavity for two or three minutes. He then syringes out with normal saline solution at 105°. This is done three

times. The cavity is immediatly plugged with gauze, the plug being left in while the graft is cut, and only removed when everything is quite ready for applying the graft.

Marriage describes his method of cutting and applying a *Thiersch graft* at the end of the radical mastoid operation as follows. The patient's thigh is placed in the abducted and everted position, and a small sand-bag is put under its lower end so as to get a flat surface. The assistant then places the ulnar surface of his hand about 3 in. above the knee, and draws the skin downwards towards the knee as much as possible. With his left hand Marriage makes counter-traction towards the hip so as to get the skin fully stretched, and then, with a hollow-ground razor, he cuts a thin graft about 3 in. long and 2 in. wide, always cutting towards the knee. The graft is got into position by floating it on the surface of the saline solution which fills the bony cavity, and then withdrawing the fluid below the graft by means of the suction apparatus recommended by Ballance. It is kept in place by the immediate insertion of a long strip of ribbon gauze, half an inch in width, on which has been dusted some aristol powder to prevent the discharge from becoming offensive. The end of the gauze is passed through the meatus, and the free end of the graft is brought out through the meatus so as to cover its cut edges. The gauze plug is left untouched until the fourth day after operation, when it is withdrawn, and the cavity is syringed out with a weak solution of hydrogen peroxide.. A small piece of ribbon gauze is again inserted to soak up the discharge. This treatment is continued daily for one week, when all plugging is stopped. Thereafter hydrogen peroxide drops are used twice daily and the patient is only seen at weekly intervals. The superficial part of the graft gradually separates, and usually comes away when the ear is syringed. When the cavity is nearly healed, Marriage uses drops consisting of equal parts of hydrogen peroxide and rectified spirit.

When this method of immediate skin-grafting is employed, the radical mastoid cavity becomes covered with epithelium in a very much shorter time than usual. It is probable also that the hearing power is improved in a larger percentage of cases than with the older methods. Contraction of the cavity and stenosis are prevented, as the granulations cannot extend across the various parts and so shut off small cavities which remain unhealed. Further, the patient is spared a large amount of pain caused by the firm plugging of the cavity according to the older methods. In a large proportion of cases the Eustachian tube is closed, so that reinfection via the tube is prevented. Lastly, the patient is able to return to his work much earlier, as he is not obliged to attend daily for treatment.

Marriage claims that in ninety-nine out of a hundred cases the graft takes perfectly well, and that even in the exceptional cases islets of cells are left behind from which the skin quickly grows over the cavity. If there is a fistula in the bony wall of the semicircular canal, without damage to the membranous canal, the primary skin-graft should be

employed; but in cases of labyrinthine suppuration, in which the object of the operation is to obtain free drainage, it is advisable not to insert a graft.

Otitic Sinus Thrombosis.—E. W. Day[10] holds that there are a far greater number of cases of sinus thrombosis from aural infections than is generally supposed. He believes that, if the clot in the sinus does not break down and discharge freely into the general circulation, we do not get the classical symptoms—hectic temperature, rigors, and sweating. He classifies his 45 cases of sinus thrombosis into three general groups: (1) Those in which the septic material is drained directly into the veins or aspirated into the opposite sinus: these amounted to 36; (2) Those—3 in number—in which the distal ends of the clot remain firm and become organized, the centre breaking down and draining through a rupture of the sinus wall; (3) Those in which the entire clot becomes organized and sterile, with obliteration of the sinus. These cases numbered 6.

In each case in Group (2) there was a perforation of the posterior wall of the mastoid cavity over the sinus. The rupture of the sinus took place at this point, and the contents discharged into the necrotic mastoid cavity. The symptoms were not distinctive or severe, but resembled those of a mastoiditis with an epidural abscess. All made an uneventful recovery. In all of the six cases belonging to Group (3) the diagnosis was made on the operating-table and was not previously suspected. Day remarked that he will never know how many have passed unrecognized. He holds that 9 atypical cases of sinus thrombosis out of 45 (20 per cent) would seem to show that absence of the classical symptoms does not justify an assumption that there is no thrombosis. In 13·5 per cent of the cases nature had effected a cure.

Friedenwald and Downey[11] note that *choked disc* is not an unusual occurrence in thrombosis of the lateral sinus. Jansen observed it in 50 per cent of his cases. Friedenwald and Downey record two cases. In one, three weeks after an operation upon the sinus, a subtemporal decompression was performed by Bagley, Jun. The dura was found to be tense, and when incised, cerebrospinal fluid spurted freely. After evacuation of a considerable amount of fluid, the cortex ceased bulging. The wound was not drained; good recovery. The choked discs rapidly subsided, the hæmorrhages in the right fundus were absorbed, and the veins resumed their normal calibre. Three months later her vision was $\frac{1}{1}\frac{6}{6}$ with each eye. [There appears to be little or no reason why lumbar puncture—repeated if necessary—should not be as effective as cerebral decompression.—J. S. F.]

Chronic Middle-ear Catarrh.—Dixon[12] states that there are a hundred cases of gradual, insidious deafness, growing worse year by year, to one surgical case. The author refers to instances of 'catarrhal' deafness caused by an infection in the membrane lining the middle-ear chamber, with round-cell infiltration and subsequent formation of fibrous tissue. The process is usually associated with an acute or

chronic infection of the nasopharynx. The Eustachian tube in these cases may or may not be permanently occluded. The drum membrane is opaque, thickened, and retracted. The most pronounced disturbance in hearing is no doubt caused by the fixation of the stapes, but inflammatory adhesion bands in the tympanum play an important role. These bands are often formed out of the folds of mucous membrane connecting the ossicles with the walls of the tympanum. The difference in the development of these folds explains why one person with oft-repeated attacks of mild middle-ear inflammation develops a serious deafness, while another with a similar process may suffer only a slight defect in hearing. Dixon holds that at any rate some of these cases can be improved by applications to the Eustachian tube as follows. To treat the right tube, he introduces the Holmes nasopharyngoscope into the nasopharynx through the left nostril. The instrument is adjusted so that the upper half of the mouth of the tube is in plain view. The dressed applicator is now dipped into a 5 per cent cocaine and adrenalin solution, and passed through the right nostril with the left hand in such a way that the tip of the applicator is on the floor of the nose. The operator looks into the nasopharyngoscope, which he holds with his right hand, and sees the applicator as it emerges into the nasopharynx, with its tip pointing downward. He carries it backward and outward into the mouth of the tube, and places the tip on or near the floor of the tube. He then rotates the applicator outward, upward, and backward into the upper part of the tube. If the operator meets any resistance it is well to pause for a few seconds to anæsthetize the mucous membrane, then gradually pass the applicator a little further, until the isthmus is reached. The next step is to treat the entire cartilaginous tube with a 1 per cent solution of nitrate of silver, or argyrol, by the method described above. Force is never justifiable, a slight pressure being all that is necessary in any case.

The prognosis is not good in those cases where the occlusion of the tubes has not been a factor in the cause of the deafness, or in those with adhesive bands within the tympanum.

References.—[1]*Med. Rec.* 1916, i, 912; [2]*Jour. Amer. Med. Assoc.* 1916, i, 422; [3]*Boston Med. and Surg. Jour.* 1915, ii, 616; [4]*Zeits. f. Ohrenheilk.* 1916, June; [5]*Jour. Laryngol. Rhinol. and Otol.* 1916, Feb.; [6]*Ann. Otol. etc.* 1915, Dec.; [7]*Laryngoscope*, 1916, 7; [8]*Jour. Laryngol. Rhinol. and Otol.* 1916, Mar.; [9]*Ibid.*; [10]*Laryngoscope*, 1915, 757; [11]*Ann. Otol. etc.* 1915, Sept.; [12]*Laryngoscope*, 1916, June.

EAR, SYPHILIS OF. (*See also* Syphilis.) *J. S. Fraser, M.B., F.R.C.S.*

Congenital syphilis ranks after epidemic cerebrospinal meningitis and middle-ear suppuration as the most frequent cause of acquired deaf-mutism, while many cases of 'congenital' deaf-mutism are really due to intra-uterine syphilis or to syphilitic changes in the ear, occurring before the child has learned to talk. Statistics as to the frequency of deafness in children suffering from congenital syphilis vary from 33 to 60 per cent.

Acquired syphilitic disease of the ear is also of importance, on account of the frequent occurrence of sudden and severe deafness in the secondary and tertiary stages. Of cases of nerve-deafness of unexplained origin, 33 per cent have a positive Wassermann reaction, thus pointing to a probably syphilitic origin.

Congenital Syphilis.

Pathology.—1. *In the Fœtus and in Infants.*—Otitis media is of common occurrence, not only in infants, but also in children born prematurely. In some cases the infective processes involve the labyrinth by rupture of the annular ligament and consequent invasion of the vestibule through the oval window. Microscopic examination of the ears of congenital syphilitic infants has shown: (*a*) Delayed ossification of the petrous bone, with abnormal marrow spaces. (*b*) Intra-uterine meningitis and neuritis of the eighth nerve. (*c*) Hæmorrhages in the middle and inner ear have often been observed; they were probably due to suffocation. (*d*) Changes in Corti's organ and in other parts of the membranous labyrinth and nerve apparatus, especially in the spiral ganglion, have occasionally been noted, but may in some cases be explained by post-mortem changes. Alexander states that the most severe forms of ear syphilis occur in intra-uterine life. The new-born infants show all the signs of congenital deafness, and the static labyrinth is not excitable.

2. *In Young Children* suffering from congenital syphilis, what appears to be a case of simple Eustachian catarrh runs an unfavourable course (McBride). Treatment does no good, and the drumheads remain thickened and indrawn, while the deafness is severe and persists. There is a combination of middle-ear catarrh and labyrinthine deafness. From this it would appear that, if cases of middle-ear catarrh do not rapidly clear up—especially if they are accompanied by severe deafness—it is advisable to have the Wassermann or Noguchi reaction tested.

3. *The Late Type of Congenital Syphilis*, in which deafness occurs usually between the seventh and thirteenth years, may be due to (*a*) neuro-labyrinthitis spreading from the meninges, or to (*b*) a blood infection of the labyrinth capsule, or (*c*) otitis media followed by paralabyrinthitis or invasion of the labyrinth. Many otologists agree that the tympanic membranes are seldom normal in the late form of congenital syphilis deafness. This points to a past attack (or attacks) of otitis media.

Fraser[1] holds that, at least in some cases, the late form of deafness is due to syphilitic otitis media—possibly with mixed infection—which either invades the bone of the labyrinth capsule, giving rise to a chronic form of osteomyelitis, or breaks through into the hollow spaces of the inner ear, causing labyrinthitis.

Clinical Aspect of the 'Late' Form of Congenital Syphilitic Deafness.—Females are affected much more frequently than males

(15 to 6). As a rule the eye trouble (interstitial keratitis) comes on three or four years before the deafness. Sometimes there is a recurrence of the eye trouble with the onset of the deafness. 'Hutchinson' teeth are present in 50 per cent of the cases. The deafness may come on gradually or suddenly (apoplectiform type). In some cases it is stated that it comes on in a single night. It may or may not be accompanied by giddiness and disturbance of balancing. The drum-heads are very seldom normal. Of 33 cases examined by Fraser, the tympanic membranes were only normal in 4, and of 31 cases observed by Nager, only 9 were normal.

As a rule the bone-conduction is greatly shortened, and it may be altogether absent. The watch is not heard by bone- or air-conduction. The upper tone-limit is much reduced, while the lower tone-limit is normal or raised. Rinné's test is usually positive, i.e., air-conduction is better than bone-conduction, and the tuning-fork, when placed on the middle of the vertex, is heard in the better ear. In a few cases, on the other hand, the deafness belongs to the middle-ear type.

Of 24 cases examined by Fraser, the vestibular reaction to rotation and cold syringing was absent in 14, reduced in 7, and only normal in 4. Hennebert was the first to call attention to the presence of 'compression' nystagmus in some cases of congenital syphilitic disease of the ear. Increase of the air-pressure in the external meatus by means of a valveless Politzer bag causes a slow movement of the eyes to the same side, while aspiration brings about a slow movement to the opposite side. Hennebert finds that in these cases the rotation reaction is always absent, while the caloric reaction is reduced. Alexander thinks that Hennebert's sign is due to a change in the nerve-endings, while Bárány holds that it is due to excessive mobility of the stapes. Fraser suggests that the bony wall of one of the canals is eroded by inflammatory changes in the marrow, and the hollow spaces of the canal are partly filled up by syphilitic granulation tissue, so that the rotation and caloric reactions cannot be produced. The more powerful pneumatic test is, however, able to bring about an abnormal or reversed fistula symptom.

Suspected cases should be examined for the presence of interstitial keratitis, Hutchinson teeth, ozæna, saddle-back nose, perforation of the nasal septum, and scars on the palate, pharynx, and at the angles of the mouth. Many cases show defective mental development and infantilism. The patient's mother should be questioned as to miscarriages and still-births. In doubtful cases the Wassermann reaction or Noguchi's skin test may be applied.

Acquired Syphilis.

External Ear.—(1) Primary syphilis of the outer ear is rare. The disease is inoculated by kissing, biting, the use of infected towels, or by piercing the ear with infected instruments. (2) Secondary syphilitic affections (condylomata and papules) of the external ear

and meatus appear to be more common. In most instances the condition appears to be secondary to syphilitic middle-ear suppuration. In addition to general treatment, **Calomel** may be applied locally. (3) The auricle and external meatus may be the seat of gummatous ulceration.

Middle Ear.—Over 100 cases are on record of chancre at the orifice of the Eustachian tube. These belonged mostly to the pre-antiseptic days, in which unsterilized vulcanite Eustachian catheters were transferred from an infected nose and nasopharynx to a healthy one. Modern methods have rendered primary syphilis of the nose and nasopharynx very rare.

Secondary syphilis is probably of much more common occurrence than is usually supposed. Syphilitic nasopharyngitis may spread up the Eustachian tube to the tympanum and give rise to the symptoms and signs of catarrhal otitis media. Bezold says that if the labyrinth is affected in the secondary stage of acquired syphilis, one usually finds otitis media as well. As a rule only one ear is involved. The onset of deafness in these cases is usually rapid, but the pain is slight. Tinnitus is marked, and giddiness may be present. The drumhead is thickened, but inflation produces no improvement in hearing.

Syphilitic otitis media in the tertiary stage is usually due to an affection of the nasopharynx—gumma or ulceration. The otitis may be a simple catarrh, a suppurative inflammation, or an adhesive process. The deafness is usually marked. Ulceration of the mucosa may occur, and be followed by caries and necrosis of the tympanic walls associated with facial paralysis. Rapid destruction of the drumhead and loss of bone-conduction are in favour of syphilis. In many cases inflammation of the labyrinth is combined with the otitis media (syphilitic pan-otitis).

Labyrinth and Eighth Nerve: 'Neurolabyrinthitis.'—*Secondary Syphilis.*—Beck finds that in 80 per cent of syphilitic patients the bone-conduction is more or less shortened, although the hearing is normal. He attributes this to raised intracranial pressure, as he finds the same condition in cases of brain tumour and hydrocephalus. Beck performed lumbar puncture on some of his syphilitic cases, and found that, after this, the shortening of the bone-conduction disappeared for a time, though it returned in two or three days. Cases in which the primary sore is still present and the Wassermann reaction is negative do not show this shortened bone-conduction. The latter only appears with the constitutional symptoms. The sign may be of value in the diagnosis of syphilis. Labyrinth symptoms, i.e., tinnitus, deafness, giddiness, nausea, vomiting, disturbance of balancing, and vestibular nystagmus have occurred as early as the seventh day after the appearance of the primary sore. At the time of onset of the first skin rash, neurolabyrinthitis is by no means uncommon. The pathology of the condition is unknown, but Stümpke holds that the membranous labyrinth is involved by a syphilitic infiltration. Beck has examined 600 cases of secondary syphilis, and finds that

complaints of giddiness and disturbance of balancing are by no means rare. In some of these, nothing abnormal is to be found in the ears or nervous system. In others there are changes in the posterior cranial fossæ, as evidenced by nystagmus of central origin and cerebellar disturbance of balancing. The third group consists of vestibular cases which show alteration in the galvanic irritability of the vestibular nerve. At the onset, tinnitus is present in most cases, while giddiness is noted in 50 per cent. These symptoms may be observed before the skin rash appears. In the later stages of secondary syphilis the ear trouble almost always comes on along with a recurrence of the rash (Meyer). Disturbance of hearing is gradual and may vary in intensity; it is usually bilateral. Functional examination shows an affection of the eighth nerve. According to Roosa, diplacusis is a symptom of syphilitic disease of the eighth nerve.

The cochlear branch of the eighth nerve is more sensitive than the vestibular to toxins, e.g., quinine, salicylates, arsenic. Neurolabyrinthitis may occur whilst the patient is undergoing mercurial treatment, as is shown by the case of Neumann, whose patient awoke one night, after his fifteenth mercurial injection, with marked tinnitus in the right ear, soon followed by giddiness, vomiting, and cold sweats; the vestibular reaction was diminished. After the seventeenth injection there was sudden abducens paralysis on the same side. Salvarsan was given, but proved useless.

The prognosis appears to be better in the neurolabyrinthitis of secondary syphilis than the form which occurs in the tertiary stage.

Gummatous Affections of the Eighth Nerve.—Rosenstein holds that syphilitic affections of the eighth nerve are rare as compared with similar diseases of the labyrinth. The central portion of the nerve may be involved by gummata, aneurysm, or scars, while the peripheral part may be affected, along with other cranial nerves, by gummatous infiltration of the meninges and nerve sheaths. These conditions are often preceded by severe headache, sometimes of long duration.

Beck states that an affection of the cochlear nerve may be an early symptom of *tabes*.

Treatment.

The prevention of syphilitic deafness would be much more satisfactory than the more or less unsuccessful attempts to cure syphilitic affections of the ear once they have occurred. Much was hoped for at one time from salvarsan, but this remedy has proved very disappointing in the treatment of ear syphilis—indeed, many regard it as a frequent source of ear troubles. Alexander and others hold that it is dangerous to give salvarsan alone if there be any affection of the auditory nerve apparatus. Mercurial treatment should always be combined with it. Mott points out that, as the normal cerebrospinal fluid contains no protein or leucocytes, spirochætes find in it a safe

retreat, and are with great difficulty eliminated, because mercury and arsenic do not pass through the choroid plexus.

With regard to *congenital* syphilis, Findlay and Robertson hold that antenatal treatment gives the best results. They have treated seven pregnant women suffering from syphilis with **Salvarsan** combined with **Mercurial Inunction.** None of the babies showed evidence of syphilis, and in no case was pregnancy interrupted. Boardman states that congenital syphilitic infants should be treated for three or four years by means of mercurial inunction combined with **Neosalvarsan.** The latter is injected into the external jugular or scalp veins at intervals of two or three weeks (dose 0·015 grm. per kilo of body weight).

One of the great difficulties in treating cases of congenital syphilitic ear disease is the fact that children are seldom brought when the deafness first comes on. As a rule a period of months or even years elapses—at least in hospital work—before the cases are seen. If the condition were at once diagnosed by the patient's doctor the prognosis might be somewhat better. Ordinary antisyphilitic treatment appears to be of little value, for several cases are on record in which the deafness appeared while the child was undergoing mercurial treatment on account of the eye trouble. Wanner, however, advises inunction of mercury combined with the administration of **Potassium Iodide.** Cheatle states that if **Thyroid Extract** be given along with mercury and iodide, a better result may be obtained. Alexander favours the use of mercurial injections followed by salvarsan. Dench has found that in some cases injections of **Pilocarpine** are of great benefit. Pritchard believes in local **Blistering.** On the whole, it must be admitted that treatment appears to be of little value. It is very important, however, that the speech should be retained, and for this reason the child should, as soon as possible, be admitted to a deaf-mute school. Unless this be done the speech will rapidly deteriorate, so that within a few months in the case of younger children—up to a year in the case of older children—the speech cannot be understood or may be altogether lost.

Salvarsan and the Eighth Nerve.—Since the introduction of salvarsan, attention has been called to the frequency of cases of 'nerve relapse' after the injection of the remedy. In many of these the eighth nerve is involved—alone, or along with others. Some authorities hold that syphilitic neuritis of the eighth nerve was rare in the early stages of syphilis before the introduction of '606.' They believe that the salvarsan is to blame. Ehrlich, Benario, and Frey, on the other hand, maintain that the nerve trouble is due to syphilis and not to the remedy.

Statistics as to the frequency of nerve relapse after salvarsan vary greatly. Some observers have only found 6 cases in 732 patients injected with salvarsan. On the other hand, Bottela has noted 28 cases in 266 patients injected. He thinks that these lesions of the auditory nerve apparatus may be due to (1) Herxheimer reaction;

(2) Nerve relapse ; (3) Increase of an existing defect ; (4) Arsenical neuritis. It seems possible that both salvarsan and syphilis are to blame, as both are nerve poisons.

The trouble may come on within a few hours—up to a day—after injection. This form is usually regarded as an example of Herxheimer reaction due to swelling of the nerve in the narrow internal auditory meatus. Rapid and complete recovery appears to be the rule. The late form occurs from four weeks to six months after the injection. In several of the reported cases otitis media was present. Beck states that in one case arsenic was found in the urine four months after the injection of salvarsan. In these late cases the vestibular symptoms pass off, but the deafness remains.

Reference.—[1]*Edin. Med. Jour.* 1916, July.

ECLAMPSIA. (*See* Labour.)

ECZEMA. *E. Graham Little, M.D., F.R.C.P.*

C. J. White[1] records some interesting observations pointing to sensitization to common articles of diet as a frequent cause of chronic eczema, especially in young children. The observation that a large proportion of children suffering from eczema were passing stools which contained an excess of fats or of starches, led the way to experimenting with other items of diet. Susceptibility was tested by cutaneous reactions to food inoculations, on the analogy of the von Pirquet test in tuberculosis. Egg-albumen and milk are the more common offenders after fat and starch, and if none of these are indicated, a diminished thyroid secretion should be looked for. Rapid improvement was obtained by the simple alteration of diet indicated by the tests, and in several cases the eczema was renewed on renewing the incriminated items of food.

Reference.—[1]*Jour. Cutan. Dis.* 1916, 57.

EMBOLISM, FAT. (*See* Fat Embolism.)

EMPYEMA. *Lewis A. Conner, M.D.*

Percy Brown[1] emphasizes the importance of the **X Ray,** especially fluoroscopy, in the diagnosis of pleural affections, and claims that visual examination with the screen will generally furnish much more valuable information than that obtainable from the use of plates. He says that it is possible often to deduce the composition of a fluid in the chest by observing its behaviour on moving the patient before a fluoroscopic screen. He also urges the use of the *x* ray, after the fluid has been removed, to watch the progress of the expansion of the lung.

T. F. Lord[2] states that turbid fluids containing merely an excess of leucocytes secondary to lobar pneumonia are relatively favourably influenced by **Thoracentesis.** Frank empyema does not necessarily follow even in the presence of positive cultures for the pneumococcus. In tuberculous cases, where the pus is sterile or contains the tubercle bacillus alone, he thinks that thoracentesis is the better procedure.

In the operative treatment of this condition, H. Lilienthal[3] recommends a much more thorough procedure than has hitherto been the general custom. He emphasizes the importance of making a careful exploration of the pleural cavity, where possible, in order to determine the cause of the empyema. He therefore advises a **Transpleural Incision** in the seventh or eighth interspace close to the upper border of the rib from the angle almost or quite to the cartilage. By the use of a rib-spreading retractor he widens the intercostal space to four inches or more, and is thus able to make an inspection of most of the interior of the thorax. In this way he is able to detect subdiaphragmatic abscess or superficial abscess in the lung and treat them as well. He is of opinion that it is only by some such method that the exudate can be removed and the lung mobilized in a chronic empyema, and the results are better than from any of the operations which are designed to collapse the chest wall down on the constricted lung. He uses tube drainage together with intermittent suction and pulmonary gymnastics to favour the expansion of the lung. Objection has been made to this incision because of the danger of tearing into the mediastinum, and it has been proposed instead to excise portions of several ribs. All authors agree that the most important factor in obtaining a good result is the efficient re-expansion of the lung, but the methods directed toward that end are many and various.

F. J. Cotton[4] recommends stretching a square of rubber dam over the tube end, putting it under slight tension, and running a little glycerin under it. This apparatus acts as an efficient valve, and if the patient practises his pulmonary gymnastics energetically he will drain well, his lung will expand, and a negative pressure will be maintained in his pleural cavity. F. B. Lund,[5] on the other hand, makes use of a flap of skin as a valve, bringing the tube out obliquely and suturing over it the skin-flap. He also performs decortication in chronic empyema, but prefers the resection of several ribs to the intercostal incision of Lilienthal.

J. H. Pryor[6] investigated the function of the diaphragm in patients who had recovered from empyema, using the *x* ray and the fluoroscopic screen. Out of 31 patients over fifteen years old, he found that 26 showed a unilateral immobility of the diaphragm. He is of the opinion that this is due to pressure paralysis and atrophy following the mechanical depression by the fluid in the pleural cavity.

References.—[1]*Boston Med. and Surg. Jour.* 1915, clxxiii, 802; [2]*Ibid.* 798; [3]*Ann. Surg.* 1915, lxii, 309; [4]*Boston Med. and Surg. Jour.* 1915, clxxiii, 804; [5]*Ibid.* 808; [6]*N. Y. Med. Jour.* 1916, ciii, 781.

W. I. de C. Wheeler, F.R.C.S.I.

The treatment of empyema of the thorax cannot be said to be on a satisfactory basis. Chest wounds in the war are followed, as a rule, first by hæmothorax, and in a large number of cases by subsequent infection. Repeated examinations of the fluid should be made, and when the presence of micro-organisms is confirmed, drainage promptly provided. Attempts at siphon drainage by methods familiar in

drainage of the urinary bladder have, so far, not been attended with great success. Willensky, like most other surgeons, found the method unsatisfactory. Suction drainage can be established easily for a few days, but afterwards it is very difficult to provide an airtight apparatus. Linenthal and Ware[1] discuss the recent progress in the operative treatment of empyema. They begin their investigations with the assumption that empyema is a pathological and a physiological problem, and not merely a matter of the mechanical emptying of a cavity from the most suitable point. With few exceptions, all patients were examined with *x*-ray plate or screen—an invaluable aid when selecting the type of operation. It was found that in the encapsulated cases and in the more chronic general empyemata the affected side is apt to show contraction of the chest instead of distention, the ribs being closer together than on the healthy side. This appearance indicated tough peripleuritic confining membranes, so that at operation the lung did not expand, and required mobilization by the division or removal of the exudate. The best point for drainage is shown by a photograph, and isolated sacs of pus can be similarly accurately localized. After study of the physical signs and the radiograph, the patients were subjected to puncture with an aspirating needle, but this should not be done until the patient is on the operating-table or within a few hours of operation. When the empyema was secondary to pulmonary disease, the authors avoided ether as an anæsthetic, and employed either local infiltration or nitrous oxide and oxygen narcosis. The acute cases were relieved by the insertion of a tube into the pleural cavity in the seventh or eighth interspace (minor thoracotomy), in the posterior axillary line. Some of these cases got well, but those which were improved and showed no sign of prompt healing were considered suitable subjects for major thoracotomy. The steps of the operation are as follows: (1) Skin and muscle incision in the seventh or eighth interspace. Line of border of the lower rib, to avoid nerves and vessels. (2) Pleura entered carefully to avoid possibly adherent lung. (3) Rib retractor inserted and ribs separated from 4 to 6 inches. If still greater room is needed, cut a rib or two above or below the wound at the posterior angle to aid exploration. (4) Removal by suction or sponging of all pus and débris.

Adhesions to the chest wall should not be disturbed. If the lung expands and fills the chest when the patient is drained, the wound may be closed. The ribs will not fall together, owing to the division of the intercostal muscles, and so, while leaving drainage openings, it is not often necessary to put in tubes or gauze.

Should an inoperable pulmonary suppurating lesion be found, a portion of rib with the periosteum should be resected so as to permit of continued drainage without a tube. The operation recommended when the lung is bound down by tough exudate is shown in diagrammatic form in *Figs.* 17–19. Hæmorrhage is moderate and often absent. A slight wound of the lung is not serious, but no special

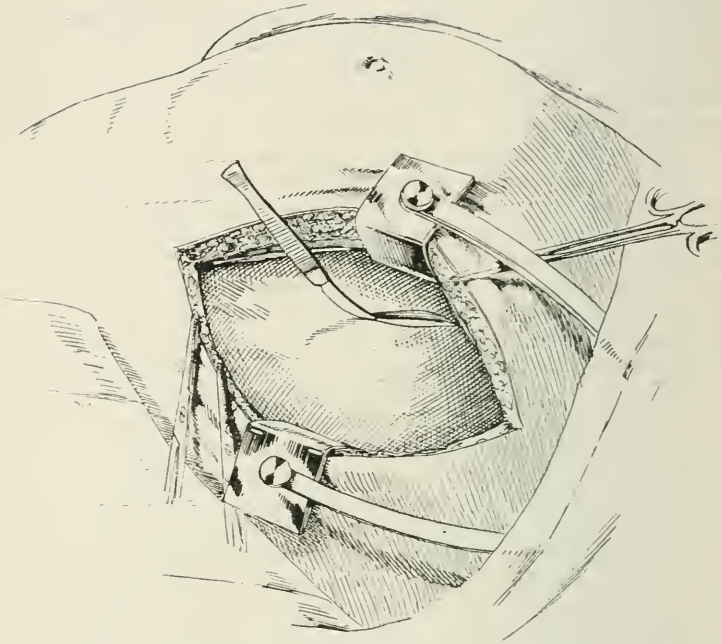


Fig. 17.—Operation for empyema. The chest is open, the rib spreader in place. The scalpel is making the incision through the layer of dense exudate which confines the lung.

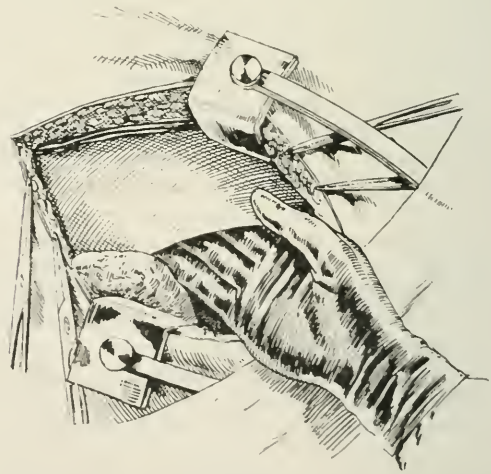


Fig. 18.—Operation for empyema. The fingers are separating the layer of dense confining exudate from the visceral pleura. The lung protrudes below.

effort should be made to denude every portion of the lung surface. During these procedures, secondary abscesses may be found and turned into the main cavity ; if the lower lobe of the lung is adherent, it should be loosened with the greatest caution, for fear of entering the abdominal cavity. On the other hand, collections of pus were found several times between the lung and diaphragm.

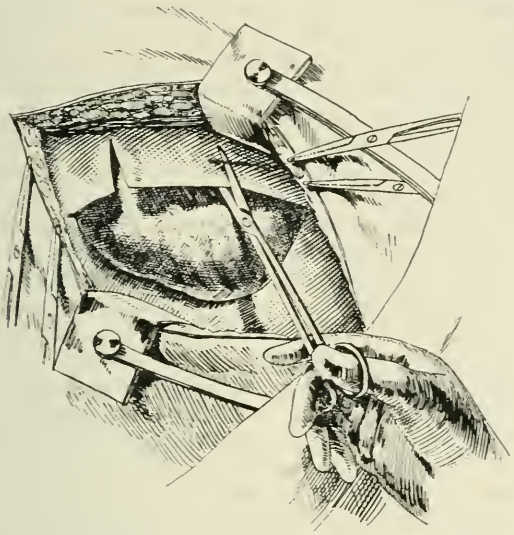


Fig. 19.—Operation for empyema. With the scissors incisions are made in the exudate to permit a freer expansion of lung. (*Figs.* 17–19 *redrawn from the* '*Medical Record.*')

The operation described above has many advantages—there is large exposure, little danger, little hæmorrhage, and the deformity following multiple rib resection is of course absent. It is obviously more rational to bring the lung by mobilization out to the normal thoracic limits than by great rib-resection to bring a rigid chest wall down to the collapsed lung. Incapsulated empyema is treated, after diagnosis by *x*-ray photography, by resection of ribs with periosteum, as an ordinary abscess.

Reference.—[1]*Med. Rec.* 1916, ii. 89.

EPIDIDYMIS, SURGERY OF. *J. W. Thomson Walker, M.B., F.R.C.S.*

Walther[1] recommends the treatment of acute epididymitis by **Aspiratory Puncture** as practised by Baermann. The following is the technique adopted: The scrotum is shaved, and then thoroughly cleaned with green soap, and the point of puncture painted with tincture of iodine. The affected testis is firmly grasped with one hand, the epididymis facing upwards, and the skin on the stretch. A very sharp, fairly large needle, connected with a 10-c.c. Record

syringe, is thrust for half to two-thirds of an inch into the substance of the epididymis, and gentle aspiration attempted. The needle is slowly withdrawn, aspiration being continued. Two or three punctures are made at different parts. The wounds are sealed with collodion dressing, and a suspensory bandage applied to the scrotum. Confinement to bed is not necessary. Ethyl chloride is used to anæsthetize the skin, and, in the case of a nervous patient, a few cubic centimetres of 2 per cent novocain solution might be injected subcutaneously. The procedure is painful, but the relief from pain is rapid and the duration of the inflammation is curtailed.

In an article on *tuberculosis of the seminal vesicle and epididymis*, Pluggemeyer[2] states that genital tuberculosis is rare before the fourth month, the percentage increasing to a maximum in the third and fourth decades. In early life both sides are often affected, but after twelve years the majority of cases are unilateral. When tuberculosis involves the epididymis only, **Epididymectomy** should be performed. If both epididymes are involved, double epididymectomy is indicated. Masculinity is not impaired, and sterility has usually been established already. It is, the author believes, questionable if orchidectomy is ever indicated. If both epididymes and tubes are involved, it is better to incise and drain. Removal of the epididymis and contiguous portion of the vas has a permanent effect in curing the process in the vesicles. If the vesicle only is affected, vesiculectomy should be performed; but if the prostate is also affected, it is contra-indicated. The prognosis of primary genital tuberculosis in children is usually good. In later life there is a tendency to spread, and this is an argument in favour of radical operation. Until ten years have elapsed, no patient can be considered cured.

Catton[3] points out that the condition of the blood is strikingly similar in the various *infectious diseases* in which orchitis occurs as a complication. Hæmatogenous infection of the testis may occur in mumps, typhoid, malaria, influenza, Malta fever, typhus, filariasis, syphilis, tuberculosis, leprosy, small-pox, and, less frequently, in scarlet fever, tonsillitis, pneumonia, and septicæmia. A reduction, absolute or relative, in the number of granular leucocytes is characteristic of these infections, with the exception of scarlet fever, tonsillitis, pneumonia, and septicæmia. The author suggests that there is a definite relation between the testicular affection and a disturbance in the normal relation of the granular and hyaline leucocytes; that is, a decrease in the number of granular cells and an increase in the number of hyaline cells.

References.—[1]*Med. Rec.* 1915, ii, 567; [2]*Surg. Gyn. & Obst.* (Abstr.), 1916, ii, 91; [3]*Ibid.* i, 651.

EPILEPSY. *J. Ramsay Hunt, M.D.*

Shanahan, Munson, and Shaw[1] have recently studied the question of *syphilis in epilepsy* in the Craig Colony at Sonyea, New York. The clinical material of the colony includes approximately 4100 cases, and

of this number there were 133, or 3·2 per cent, in which syphilis was suspected. During these investigations the Wassermann reaction was tested on practically the entire population of the colony, with the following results: 845 males, 1·42 per cent; 628 females, 1·76 per cent; total 1473 cases, 1·59 per cent. It is interesting to note that the records of the colony showed only 4 definite Argyll Robertson pupils and 3 cases of syphilitic eye conditions. These figures are of little numerical value, but show the small number of cases in which syphilitic eye conditions are found in a large series of cases. In 305 brains examined at autopsy, there were syphilitic lesions in only 2—both of which were gummata. In additional cases, extending the series to over 600, there have been no further findings.

From their studies they conclude that an epileptic with syphilis is not necessarily a patient with syphilitic epilepsy. The occurrence of syphilis among epileptics does not seem to differ much from that among the population as a whole. In many cases the diagnosis is exceedingly doubtful, and should be supplemented by examination of the patient's parents, brothers, and sisters, not forgetting the use of the Wassermann and luetin tests.

Luetin tests show the highest proportion of positive results, while the Wassermann positive cases are somewhat below 2 per cent. They believe that there is no distinct clinical type of syphilitic epilepsy. Syphilis is merely one of the many agencies which may produce the disorder.

The heredity of epilepsy is an important practical question for the practitioner. He is often consulted as to the advisability of marriage for those who are afflicted with this disease, and the dangers of transmission to the offspring. D. A. Thom,[2] of the Monson State Hospital, Massachusetts, has studied the relation between the genetic factors and the age of onset in 157 cases of hereditary epilepsy. He divides the chief hereditary factors into epilepsy, alcohol, insanity, feeble-mindedness, and migraine.

Of these cases, 82 were females and 75 were males; 126 had direct heredity (that derived from parents or grandparents), and 31 had collateral heredity (that shown in members of the family other than parents or grandparents). There were 293 heredity defects in the 157 cases, occasionally one member of the family having more than one defect, and in other instances two or more relatives being defective.

The table on the following page shows the distribution of the five genetic factors among the total of 293 taints recorded.

A study of this kind opens up many interesting side-lights on the question of heredity, which may be summarized as follows: Epilepsy, alcohol, insanity, migraine, and feeble-mindedness are named in the order of the frequency with which each factor was met. Named in the order of their potency in the production of an early onset of the epilepsy in the offspring, feeble-mindedness came first, followed by migraine, epilepsy, alcohol, and insanity. With the exception of

alcoholism, all the maternal defective factors were manifested in the offspring at an earlier date in the form of epilepsy than those factors transmitted by the father. When both parents had the same defect the onset was at an earlier date than in those cases where only one parent was defective. There was practically no difference between the average age at onset in those cases inheriting two or three defects, and in those where the family history revealed but one. Those cases with direct heredity averaged an earlier onset than those with collateral heredity.

HEREDITY—GENETIC FACTORS IN 157 CASES OF EPILEPSY.

Direct (126).

	Mother	Father	Mat. G'mother	Pat. G'mother	Mat. G'father	Pat. G'father	Total
Epilepsy	15	14	9	1	4	7	50
Insanity	4	9	2	3	2	4	24
Feeble mindedness ..	9	4	—	—	—	—	13
Alcohol	9	42	—	—	4	3	58
Migraine	25	7	1	1	—	—	34
	62	76	12	5	10	14	179

Collateral (31).

	Sister	Brother	Pat. Uncle	Mat. Uncle	Pat. Aunt	Mat. Aunt	Cousin	Uncle unknown	Aunt unknown	G'father unknown	G'mother unknown	Totals
Epilepsy ..	20	17	5	5	6	5	14	3	2	—	—	77
Insanity ..	4	4	2	1	4	2	7	1	2	2	—	29
Feeble mind-edness	—	—	3	1	—	—	—	1	—	—	—	5
Alcohol ..	—	1	—	—	—	—	—	—	—	—	—	1
Migraine ..	1	—	—	—	—	—	—	—	1	—	—	2
	25	22	10	7	10	7	21	5	5	2	—	114

Charles A. L. Reed[3] describes the *diagnostic methods and pathological constants in idiopathic epilepsy*. His records now number over 700, of which only 168 patients have been submitted to operative treatment. On the basis of these investigations a number of wide and seemingly rather rash generalizations are suggested: for example, the preponderant rôle of constipation in idiopathic epilepsy; its relation to mechanical stasis of the intestine, especially the large bowel: the constancy of certain physical and æ-ray findings of the abdominal contents; the existence of a specific toxæmia, with the production of a chronic acidosis and a toxic œdema of the brain as one of the essential factors in epilepsy. The last link in the chain of these smoothly

flowing investigations is the isolation of an epilepticoccus, later called the *Bacillus epilepticus*, which is termed the specific organism of this disease. In discussing this phase of the subject, Reed states that he accidentally found that the whole field had been covered previously, and that an organism of apparently identical morphology had been discovered by Bra quite fourteen years ago. This important communication was made to the French Academy of Sciences at that time, but, marvellous as it may seem, its significance has been ignored by the profession up to the present moment, just as Mendel's great discovery of the law of heredity went without recognition until it was rediscovered by De Vries sixteen years later. In this connection, however, he states that in his own practice, as a means of ultimate diagnosis, the epilepticoccus has the same relative importance to epilepsy that their respective etiological organisms have to malaria, tuberculosis, tetanus, diphtheria, or typhoid.

His general conclusions are as follows: Idiopathic or essential epilepsy is an infection. The infecting organism, whatever may be its primary habitat, finds its way under circumstances of forced absorption from the alimentary canal into the blood. The conditions that enforce absorption from the alimentary canal consist in mechanical distortions, with a resulting constipation in the form of either obvious or masked stasis.

These conditions point to a logical line of treatment as follows: (1) The organism should be isolated in each case with reference to the development of an antigen and the possible immunization of the patient. (2) In the absence of such immunization, or in recurrence after apparent immunization, and in certain otherwise favourable cases, the mechanical conditions of the intestines responsible for the enforced absorption should be surgically corrected, and a stop thus put to the further intake of the organisms by restoring the normal drainage of the bowel. (3) Post-operative treatment should be instituted to neutralize and eliminate the residual infection already established in the glands and blood of the patient. (4) In this connection it is of the highest importance to insist that the intercurrent chronic acidosis, which exists without exception in these cases, should be as nearly as possible reversed, as can sometimes be done, although only temporarily, by appropriate treatment preliminary to surgical interference. Failure to observe this precaution will result in a high surgical mortality.

W. B. Terhune[4] also reports a bacillus isolated from epileptics. Cultures were made from twenty-four epileptics during or immediately following seizures, and a bacillus was isolated in 75 per cent. The cultures were not uniformly positive. At one time a positive culture was obtained following a seizure, while a culture made several days later after an attack might be negative. It seems possible that the time the cultures are made in reference to whether the patients are just beginning or are recovering from their convulsive periods, is a factor in isolating the organism.

Cultures were made from eighteen epileptics in whom no convulsions had occurred for several days. All of these were the same patients in whose blood the organism had previously been found immediately following a seizure. In only one case was the bacillus isolated during the quiescent period, and this patient was seriously ill with influenza at the time the culture was made.

The organism is a large, Gram-negative, spore-bearing bacillus which shows a tendency to form chains. The endospore is central in location, elongated in form, and practically fills the entire bacillus when present. The spore develops in from forty-eight to seventy-two hours. The organism grows slowly. It is not found in a blood-culture under seventy-two hours after the culture is made. In all cases from three to eight days were required to secure a good growth. Terhune believes that the time required for the growth to develop is partially responsible for some observers having failed to find the organism.

He concludes that the bacillus isolated is identical with the *Bacillus epilepticus* described by Reed, and that it is an etiological factor in epilepsy. The bacillus was isolated from 75 per cent of epileptics examined. It was present during and following a seizure, but not during the intraconvulsive period, except in the case of one patient who was debilitated by ill health. It was not found in non-epileptics. It causes typical epileptoid convulsions in cats, during which death occurred, both when they are injected intravenously and when they are fed with cultures of the organism. It may be recovered from the animal during the convulsions and after death.

A bacteriological study of the blood of seventy epileptic patients, with special reference to the *Bacillus epilepticus* of Reed, is reported

Relation of Specimens to Time of Convulsions.

When taken	Number
During status	4
At cessation of grand mal seizure ..	10
,, petit mal ,, ..	2
Within one hour after last seizure ..	29
Between 1 and 2 hours	10
,, 2 ,, 3 ,, ...	6
,, 3 ,, 4 ,, ...	2
,, 4 ,, 5 ,, ...	3
,, 5 ,, 6 ,, ...	2
,, 6 ,, 7 ,, ...	1
,, 7 ,, 8 ,, ...	3
,, 8 ,, 9 ,, ...	1
,, 9 ,, 12 ,, ...	3
,, 12 ,, 24 ,, ...	1
None for several days	3
Total ..	80

by Caro and Thom.[5] According to Reed, the specific organism of 'idiopathic epilepsy' (epilepticoccus) consists of granular bodies, sometimes arranged in diplococci, sometimes in chains, sometimes in clusters, while in certain cases all these forms were present in a single case. It was to be found in the blood either just before or just after a seizure, but in the interim it disappeared. Growth of the coccus occurred readily on ordinary media, and animal experimentation fulfilled the third of Koch's laws. In all, 70 cases of clinically idiopathic epilepsy, without any demonstrable organic lesion, were studied. In this group were included 47 women and 23 men. In regard to the incidence of constipation, on which Reed laid considerable stress, it was found that all the 70 patients were suffering in varying degrees from this complication. In all, 80 specimens of blood were obtained; 10 of their cases were repeated. The total number of cultures was 160. The table on the preceding page shows the relation of the specimens taken to the time of the convulsions. Examination of these cultures showed that 156 were sterile; the remaining 4 were contaminations, and subsequent cultures were taken and found to be sterile.

In conclusion, it would seem evident that, in the seventy epileptic patients studied, the epileptic syndrome was not due to the so-called *Bacillus epilepticus* of Reed.

Wherry and Oliver[6] also reported negative findings from blood-cultures in epilepsy.

After the appearance of these adverse reports failing to confirm his observations, Reed reviews the field again under the title, "Constipation and Intestinal Infection in Epileptics,"[7] in which he reiterates his contention. The peroration at the end of his paper is almost as important as the negative bacteriological findings of other observers in forming a correct judgement as to the importance of his discovery.

"And now, a word as to the classic work of Bra. It so happened in Europe, at the beginning of this century, that there were several persons who occupied positions which made it their business to find things in the blood, if there were things in the blood to be found. Some were bacteriologists to great hospitals, some were pathologists to institutions for epileptics. They were charged with research, to solve the great mystery of the ages with respect to epilepsy. It also happened about this time that Marie Bra, untrammelled by the mediæval scholasticism that then and yet beclouds the subject, went to Ville-Evrard to study the blood of epileptics. She found an organism—found it again and again—found it seventy odd times in a hundred cases—the same organism which we have found and are yet finding under similar circumstances here in America. She injected it into rabbits, gave them epilepsy, and recovered it from their blood. She wrote reports—model reports—of her work, and gave with them, photographs of the organism in the blood—just as we are now doing in America. Then it so happened that the men whose prestige depended on finding things, and who had not found this particular

thing, suddenly found it impossible to find this particular thing. One after another could find nothing. From Moscow to Lille, from the Rhine to the Tiber, each echoed to the others, 'Nothing here.' But the undisputed and indisputable fact, the positive fact, the photographed, printed, and proved fact, the fact that an organism had been isolated from the blood of epileptics, remained. These facts, taken with other facts, seemed to imply a causal relationship between the organism and epilepsy. No new facts were or have been brought out to give it a new interpretation. It was simply beclouded by a policy of concerted and cumulative negation. This was the process of 'discrediting' an achievement which did not add to the prestige of the other fellows. Then Marie Bra, disgusted with the treatment she had received, snapped her fingers at the 'scientific' world—and married. It thus happened that humanity was cheated out of a great truth for fifteen years. Is the policy of concerted cumulative negation again contemplated? In this connection it is important for me to say that my attitude with respect to this question is purely that of a clinician interested in the practical phase of the problem. As such I, like other clinicians, must accept and be guided by the technical findings of pathologists and bacteriologists, but they must be the findings of something, not of nothing."

REFERENCES.—[1]*N. Y. Med. Jour.* 1916, i, 820; [2]*Boston Med. and Surg. Jour.* 1915, ii, 469; [3]*Jour. Amer. Med. Assoc.* 1916, i, 336; [4]*Ibid.* 1155; [5]*Ibid.* 1088; [6]*Ibid.* 1087; [7]*Ibid.* 1157.

ERYTHRÆMIA. *Herbert French, M.D., F.R.C.P.*

A very full account of a case of erythræmia (splenomegalic polycythæmia), including the post-mortem findings, is added to the literature of the subject by G. H. Clark.[1] He considers that **Venesection** is the best known treatment for alleviating symptoms in this disease.

REFERENCE.—[1]*Glasgow Med. Jour.* 1915, Nov., 321.

EXOPHTHALMIC GOITRE. (*See* GOITRE, EXOPHTHALMIC.)

EYE DISEASES, GENERAL THERAPEUTICS. *A. Hugh Thompson, M.D.*

The Desiccation Method.—This is advocated by William L. Clark,[1] of Philadelphia. By its means certain new growths can be reduced by employing heat of just sufficient intensity to desiccate but not to carbonize them. For eye work the heat is best produced by electricity, a high-speed static machine being employed, with suitable accessories for transforming the static into a high-frequency current. The current is applied by means of a fine steel needle, which is allowed to brush the tissue it is desired to destroy. It is claimed that the method is peculiarly adaptable to *growths on or near the eye*, because of the ease of application and great refinement of control. After a growth has been converted into a dry mass by the treatment, it is usually curetted away or excised, but sometimes it is better to allow it to slough. In epitheliomata of the eyelids it is said to be not always necessary to desiccate quite all the malignant tissue, as the heat penetration is

sufficient to cause a retrogression and final disappearance of the remaining cancer cells, while the normal tissue recovers. One treatment is usually all that is necessary.

The following table gives the number of cases treated by Clark in seven years :—

Epitheliomas of the lids, canthi, conjunctiva, and adjacent cutaneous surfaces (localized)	84
Epitheliomas of the lids, canthi, and conjunctiva, and involving sinuses or orbit (very advanced)	8
Round cell sarcomas of lids (localized)	2
Melanosarcomas of palpebral and bulbar conjunctiva, and cornea	4
Angiomas of lids	11
Pigmented and other moles, and warts of lids	46
Xanthoma palpebrarum	17
Lupus erythematosus of lids	3
Pterygium	3
Granular conjunctivitis	5
Corneal ulcers	3
Total number of lesions treated	186

Of the localized epitheliomata, 64 had been under observation for periods varying between one and six years after the first treatment, and of these, 54, or 84 per cent, showed no recurrence. The rest showed recurrences, but all of them apparently amenable to the same treatment repeated a second, third, or even fourth time. On the

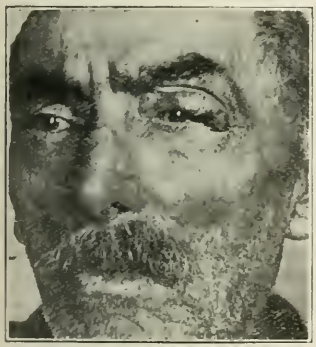


Fig. 20.—Epithelioma of upper lid, involving cartilage.

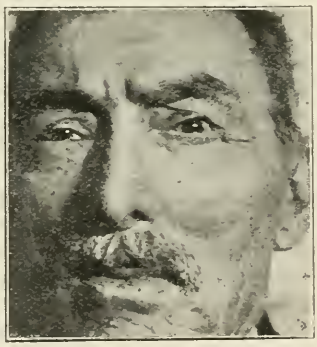


Fig. 21.—Result of the desiccation treatment; cartilage conserved; no recurrence in six months; note absence of contracted cicatrix.

other hand, in the eight cases of advanced epithelioma no cure could be expected, and the treatment was merely palliative. In the cases of sarcoma the results were less striking. "Lesions such as warts, moles with flat or pedunculated bases, and xanthoma, even though they are on the margin of the lid and involving the palpebral conjunc-

tiva, are easily removed with one desiccation treatment without noticeable scarring. There have been no failures in a total of 63 cases treated." In the case of angiomata it is necessary to carry the desiccation deeply enough to obliterate the blood-lakes. Two cases of failure were attributed to this not having been done. In the remaining cases treated the results were uniformly favourable.

Figs. 20 and 21 illustrate one of the cases.

Methylene Blue is recommended by Adams[2] for the treatment of *conjunctivitis.* In the strength of 1–1000 solution in normal saline it can be used quite freely, the smarting caused being only trifling. He uses it for both acute and chronic cases, but especially for those due to the *Staphylococcus aureus.* For pneumococcal conjunctivitis the effect was good, but for pneumococcal ulcer of the cornea it was not strong enough. For stopping the purulent discharge in cases of *obstructed lachrymal duct,* and for clearing a discharging socket, it is of great value. On the other hand, it cannot be recommended either for diplobacillary conjunctivitis (for which, as is well known, zinc sulphate is the sovereign remedy) nor for gonorrhœal conjunctivitis, whether in the adult or infant. On *acute trachoma* it has an excellent effect if used in a sufficient strength—i.e. a 3 per cent solution—on a cotton-wool swab after cocainizing the conjunctiva, or a stick of the same strength made up with holocain and orthoform.

Silver Salts.—Derby,[3] while agreeing that Crédé's method of employing a 1 per cent solution of nitrate of silver as a prophylactic in *ophthalmia neonatorum* cannot be improved upon, strongly deprecates its use in the acute stage. Strong silver preparations, he says, do good in inflammations by their ability to set up a reaction and draw in protective substances from the neighbouring tissues. Their place is therefore in those inflammations in which a sufficient reaction does not already exist. Bactericidal power is of little importance, as the gonococci lie too deep to be reached by any remedy which we have yet at our disposal. The alternative that he uses is the 25 per cent solution of argyrol, whose bactericidal power is negligible but whose cleansing action, due to its high specific gravity, is important. A further advantage is the early warning it gives of a break in the corneal epithelium by the immediate staining of the area involved. If the baby is in good condition and stands the frequent handlings well, the eyes should be cleansed as often as needed by the severity of the disease. It must not be forgotten, however, that in the zeal for frequent treatment the resisting ability of the baby must be considered, and constant handling is liable to reduce this. Whenever a conjunctival discharge persists for weeks in babies of low vitality, an improvement will very likely follow a lengthening of the intervals of treatment to once every three or four hours.

Thyroid Extract.—Chronic diseases of the eye are sometimes associated with hypothyroidism and in these cases the administration of thyroid extract is indicated. Some years ago Dunn recommended it in *interstitial keratitis* (cf. Medical Annual, 1911, 305) and other

PLATE XXI.

ILLUSTRATING THE ADVANTAGE OF PROSTHETIC TREATMENT AFTER EXTENSIVE INJURIES TO THE EYE AND FACE

SIR WILLIAM COLLINS'S CASE

chronic conditions in which malnutrition was an important factor. Bordley[4] found a striking improvement following its use in a case of severe *uveitis* with some evidence of an atypical myxœdema. He also mentions a case when much *vitreous opacity* followed a thyroidectomy, which cleared up on the administration of thyroid extract. As to dosage, he begins cautiously with 1 gr. daily, gradually increasing it to 4 gr. There appears to be a wide divergence of opinion on the subject of the dosage of this drug.

Harman[5] suggests an economical solution for preserving **Ophthalmic Alkaloids.** He informs the writer that the correct formula is :—

℞					
	Menthol	gr. ij	Tincture of Iodine		ℿij
	Oil of Wintergreen	ℿij	Distilled Water		Oj

As a proof of the effectiveness of this formula he says that a solution of cocaine in it which had been in use for three months in a wide-mouthed half-ounce bottle in an out-patient department, remained sterile. For refractive work it is customary to employ a 2 per cent solution of the pure alkaloids of homatropine and cocaine in castor oil. At present, however, the pure alkaloids are difficult to obtain, and the salts are not soluble in oil. Harman recommends that in order to obtain a solution of sufficient viscidity to cling to the end of a glass rod, his watery solution should be thickened by the addition of the requisite amount of gum arabic, making a mucilage about twice the normal strength. Although gummy solutions are favourable for the growth of moulds, the added antiseptics were proved to be effective in preventing this.

References.—[1]*Jour. Amer. Med. Assoc.* 1916, ii: [2]*Ophthalmoscope*, 1916, 78; [3]*Jour. Amer. Med. Assoc.* 1915, ii, 1317; [4]*Arch. Ophth.* 1915, Nov. (*Ophth. Rev.* 1916, Aug., 157); [5]*Brit. Med. Jour.* 1916, ii, 178.

EYE, WAR INJURIES TO. *A. Hugh Thompson, M.D.*

Unfortunately, our experience of injuries to the eye inflicted in war has been very large during the past year. Of those cases of extensive destruction of the face where an eye is involved it is not necessary to speak, except to say that in favourable cases much may be done by plastic surgery supplemented by mechanical devices. The accompanying reproductions of photographs illustrate an extraordinarily successful case of this sort under the care of Sir William Collins.[1] The first three show the appearance at successive stages of operative treatment; the fourth the appearance which was finally obtained by an artificial cheek of painted and moulded copper-plate, with eye attached set in a pair of spectacles. (*See Plate XXI.*)

Setting aside these cases, and also those, relatively rare but actually amounting to a considerable number, where the sight of both eyes has been completely destroyed, generally by bullets traversing the head from side to side in the region of the orbits without killing the man (cf. Medical Annual, 1916, 237), we may attempt a classification of eye injuries as follows. It embraces nearly all those of which

the writer has been able to find recent records, including those which he has himself seen in the eye department of a large military hospital.

A.—Direct Injuries to the Globe.

1. *Superficial Injuries.*—These include—

a. Foreign bodies in the cornea, frequently as the result of explosions. Sometimes the adjacent parts of the face are bespattered with particles embedded under the skin. The sclera as well as the cornea may have minute particles in its substance, or may merely be stained. In the sclera foreign bodies may be harmless. In the cornea it may not be possible to remove them at once, and it may be more easily done after a period of waiting. In cases where they are deeply embedded in the substance, it has been recommended to make a flap of the superficial layer of the cornea in order to reach the foreign body. Some have even found it necessary to introduce a keratome or, better, a special spatula (Usher)[2] into the anterior chamber, in order to prevent pushing the foreign body into the anterior chamber.

b. Subconjunctival hæmorrhages have often been noted, but ordinarily require no treatment.

c. Keratitis may be started by the splashing of mud from shell explosions (Stack)[3].

2. *Injuries to the Anterior Part of the Globe.*—These are the result of penetrating wounds of the anterior chamber with or without *prolapse of the iris.* If the prolapse is cut off and the iris stump replaced so that no adhesion results, and if the wound remains aseptic, a good eye may be retained. Otherwise a wound of this sort may set up much trouble.

Traumatic cataract may be present with or without a foreign body embedded in the lens. If the wound is septic there is practically no chance of saving the eye. Otherwise evacuation of the lens matter may be ultimately followed by the retention of a good, though aphakic, eye. When the wound is small, or even in case of a small foreign body in the lens, it may be left to quiet down, and the cataract can be dealt with at a later period.

3. *Rupture of the Globe.*—If this occurs as the result of a direct injury, the case must generally be regarded as hopeless, and the sooner the eye is excised the better.

4. *Foreign Bodies in the Posterior Part of the Globe.*—These cases call for both judgement and skill on the part of the surgeon, and they also require the resources of a well-equipped hospital. The diagnosis is often difficult. It is comparatively seldom that the foreign body can actually be seen with the ophthalmoscope. The services of the radiographer must therefore be called in, and even in cases where a foreign body is shown to be present by the x rays, it needs care to determine its position, and even to be certain whether it is actually in the eye or in the orbit outside it. Supposing that we are satisfied that there is a foreign body in the globe, we have to decide whether or not it is worth while to attempt to save the eye. In cases where

there is much inflammation, or again, in cases where the sight is already totally destroyed, it is not worth while. In other cases much depends on whether or not the foreign body is magnetizable. As a rule, the smaller the particle, the more powerful must be the magnet in order to elicit a sensation on the part of the patient. In some cases, however, the particle may be comparatively large, but so slightly magnetizable that a powerful magnet is necessary, e.g., when it happens to be part of the mantle of a German rifle bullet, which is made of ferro-nickel (Cunningham[4]). In this country the most popular form of large magnet is the giant magnet of Haab.

If it proves to be non-magnetizable, and if the eye is quiet, it is legitimate to leave it alone, but the eye must be carefully watched. In some cases where the foreign body is metallic (copper for instance), Mackenzie Davidson's telephone apparatus[5] may be tried. We have not, however, as yet heard of an eye the sight of which has been permanently saved by its means. Zorab[6] mentions the case of an eye the sight of which, immediately after the wound, was supposed to be completely lost. Three months later it had vision $\frac{6}{24}$, and with the ophthalmoscope three pieces of metal could be seen in the vitreous. The eye was quiet, and as the pieces of metal were bright, it was concluded that no chemical action was going on. They were unmagnetizable, and it was decided to leave the eye alone, with a warning to the patient in case he should experience any discomfort.

The more common cases are those in which the foreign body is magnetizable, and then undoubtedly it is good practice to make an attempt, at any rate, to extract it by means of the magnet, either small or large.

As to the prognosis of these cases, Brownlie[7] gives statistics of 55 cases occurring in civil practice in which the magnet was used, with results recorded two years afterwards. It must be noted, however, that these cases include not only foreign bodies in the posterior part of the globe, but in the lens and anterior chamber as well. Of the 55 cases, 28 eyes were saved and 27 lost, some of them after the foreign body had been successfully withdrawn, but leaving a globe so hopelessly disorganized that it had to be enucleated. Of the 28 eyes saved, 16 retained useful vision ranging from $\frac{6}{6}$ to $\frac{6}{60}$. The remaining 12 had vision ranging from $\frac{4}{60}$ to perception of light. Thus, of these cases, the eye was retained in one-half and useful vision in rather more than one-quarter. Cridland's[8] experience at Wolverhampton is very similar. Of 76 cases of foreign body in the globe treated with the magnet during a period of thirteen years, 41 eyes were saved and 35 enucleated. All the foreign bodies except five were of steel or iron. The following table shows how very much worse the prognosis is if the foreign body is in the vitreous than if it is anywhere else in the globe. Of the former, only one-third were saved—12 cases—and in these only one case had vision of $\frac{6}{12}$ partly, one had $\frac{6}{24}$ and the rest had $\frac{6}{60}$ and less, chiefly less. The table, it will be noted, includes one case in which the foreign body was outside the globe.

Prognosis of Foreign Bodies in the Eye and Orbit.

	Cases	Per cent	Eyes saved	Eyes lost
Vitreous	36	48	12	24
Lens	12	15	10	2
Posterior scleral wall ..	11	14	4	7
Anterior chamber ..	11	14	10	1
Anterior scleral wall ..	3	4	2	1
Iris	1	1·3	1	—
Posterior chamber ..	1	1·3	1	—
Orbit (eye also injured)	1	1·3	1	—
Total ..	76	99	41	35

It is of interest to note that in three of the 'saved eyes' in which the foreign body was embedded in the sclera after penetrating the globe, it was allowed to remain, and no harm, as far as could be judged, ensued.

The consensus of opinion appears to be that to leave a magnetizable body in the vitreous is to invite destruction to the eye, but that in the case of non-magnetizable bodies, in which no chemical action takes place, even when they are metallic, the eye stands a much better chance, supposing it to be free from inflammation. In the case of foreign bodies lodged in the lens or anterior chamber, their removal is attended by comparatively slight risk. Where foreign bodies are embedded in the posterior scleral wall after penetrating the eye, their removal is extremely difficult, and in certain cases they may be quite harmless. It goes without saying that in all such cases the risk to the second eye must be continually borne in mind (cf. Medical Annual, 1916, 238). In two of Brownlie's cases sympathetic infection actually occurred. It is an encouraging fact, however, that according to the general experience of those who have had to do with wounded eyes in the present war, the incidence of sympathetic disease has been very low (Lapersonne,[9] Ormond[10]). Its increasing rarity, remarks Dunn,[11] has corresponded with the practice of antiseptic and aseptic principles in wound treatment. "For the same reason its virulence is greatly modified, and owing to this decline in virulence the disease has become curable." In Dunn's view, it would be a gain if the term 'sympathetic ophthalmia' with its tragical connotation could be abandoned in favour of 'infective cyclitis' or 'infective ophthalmia.'

B.—Indirect Injuries from the Passage of a Projectile near the Globe.

Speaking of indirect injuries from bullet wounds in this connection, Lloyd Mills[12] says that the injury to the bulb is seldom, if ever, in a direct line with the line of incidence of the blow, but is usually nearly

at right angles to it. "This must be accepted as the effect of the rotary, boring motion of the bullet, produced by the rifling of the barrel, and which, as demonstrated here, in shots of the brain and by its action on bone and on soft organs like the liver, is by far the most pathological motion of the bullet. That this rotation of about 2500 times per second, at the rifle muzzle, could have gone so long unconsidered as the source of most of the lateral trauma along the bullet path, seems strange, in view of the radial splits and fissures which stream out at, or nearly at right angles to, the course of every bullet, in soft viscera, as well as in bone."

The seriousness of these cases varies from complete blindness of one or both eyes to comparatively trivial affections of the sight. Cases seen by the writer and reported by others include :—

1. *Iridodialysis*, in a case where there was no penetrating wound. The iris was separated from its peripheral attachment, and there was a certain amount of intra-ocular hæmorrhage. This, however, cleared up, and there was good recovery of vision.

2. *Rupture of the Choroid.*—This by itself need not be serious to vision, but it is generally combined either with (3) or (4).

3. *Intra-ocular Hæmorrhages* of all degrees occur, the smaller ones clearing up and leaving vision unimpaired, the larger ones filling a great part of the vitreous and destroying the sight of the eye.

4. *Macular Changes* as a rule involve serious and permanent impairment of vision. The changes may be of two types, one simulating a macular choroido-retinitis, the other a dark red area at the macula with small white brilliant spots in its central part (Dentrelle[13]).

5. *Detachment of the Retina.*—Out of 350 eye cases seen by A. D. Griffith,[14] eight were of this nature.

6. *Optic Atrophy* may occur as a result of a fracture of the base running into the optic foramen. Blindness may be instant, resulting from severing of the nerve, or it may come on gradually as the result of the pressure of callus. In this type the only signs are the dilated pupil inactive to direct light stimulus, and the atrophy of the disc. Or a bullet traversing the orbit may divide or rupture the nerve, when the optic atrophy will usually be associated with hæmorrhages or other fundus lesions.[15]

7. *Dislocation of the Lens* is mentioned by Lloyd Mills, but could hardly occur without other serious injuries such as have been mentioned.

8. *Rupture of the Globe.*—Lloyd Mills mentions a case in which both globes were ruptured as the result of a bullet which passed through the front of both orbits without directly wounding either eye. One eye had to be enucleated ; in the other the scleral rupture was closed by sutures.

With regard to *large hæmorrhages into the vitreous*, Ormond[16] makes some useful remarks as to treatment. The problem is different in the case of wounded soldiers from what it is in the case of the ordinary patient with vitreous hæmorrhages to whom we are accustomed

in that while the eyes of the latter are usually unhealthy those of the the former are healthy, so that if we can succeed in producing absorption, no recurrence need be feared. The following are the methods that he has tried: (1) **Massage.** This is a most useful procedure, increasing the circulation of the fluid contents of the eye, and, by increasing the number of leucocytes entering the organ, assisting in the removal of solid exudation. (2) **Ionization** with iodide of potassium. He thinks that the method has certainly been of value, but suspects that it is the general action of iodides rather than the local one that is of importance. (3) **Subconjunctival Injections of Normal Saline** solution every two or three days were apparently of some use, probably due to the mechanical acceleration of the lymph-flow. (4) Removal of some of the fluid and its substitution by normal saline. Following some experiments by Elschnig, of Prague, Ormond tried this method in two blind eyes without any apparent benefit. (5) **Fibrolysin** injections have been found to produce a great excess of leucocytes in the blood. Hence it may be employed to promote absorption. (6) **Dionin** produces, as is well known, a rapid conjunctival chemosis, and is employed to increase the flow of lymph and so promote absorption. (7) **Potassium Iodide** enjoys the greatest reputation among the older drugs as an absorbent, though how it acts is not explained. (8) **Radium** has been recommended in cases of large vitreous hæmorrhages, but Ormond is not very hopeful as to its value, either on theoretical or practical grounds.

On the whole, in Ormond's opinion, mechanical treatment is not only the safest but the one most hopeful for the future.

C.—Functional Effects.

Under this heading we include all such cases of shell shock, excessive strain, or bodily and mental exhaustion as are followed by subjective affections of the sight without any objective cause which can be discovered, although it is by no means certain that in many cases it does not exist. They include obstinate photophobia, amblyopia of one or both eyes of all degrees, weakness of accommodation, and night blindness without any retinal change. A great many of these are completely cured by rest, but obstinate cases are very difficult to deal with. Occasionally sudden and marvellous cures happen and get reported in the sensational press. Sometimes **Suggestion,** with or without hypnosis, has been successful. Ormond and Hertz[17] report a number of cases treated in this way, and state that marked improvement has been attained in every instance. There remain a number which become chronic and are the despair of those who have to treat them. It may be noted that under the stresses to which soldiers at the front are subjected, defects of refraction, previously latent, frequently become manifest, and sometimes apparent partial amblyopia is due to this cause. The power of accommodation is very often affected. Cases of night blindness are not uncommon. It is possible that in some of these there may be a slight degree of

retinitis pigmentosa which, before the stress of war occurred, caused no symptoms, but which becomes active as a result of mental and physical strain. The writer has seen at least one case which will bear this interpretation. Similarly, cases in which nystagmus was latent on enlistment may become manifest.

D.—Hemianopia due to Wounds of the Occiput.

As is well known, the cortex of the occipital lobe is related to the function of vision in this way: a lesion of the right occipital lobe causes blindness of the left half of the field of vision in both eyes, and a lesion of the left occipital lobe causes blindness of both fields on the right side. Further, the particular part of the occipital cortex which is related to vision is known to be the lips of the calcarine fissure, lying mostly on the internal aspect of the hemisphere but also reaching its external aspect at the extreme tip of the occipital lobe. The microscopical structure of this part of the cortex is peculiar in that here alone the 'line of Gennari' is found. The area is known as the 'area striata (*Figs.* 22, 23).

Among recent attempts to carry still further the localization of visual function in the cortex, the work of Lister and Holmes[18] will take a high place. They have been able to observe, as the result of wounds of the cortex:—

1. A certain number of cases of '*quadrantic hemianopia*,' i.e., loss of field in one quarter of the normal field of both eyes, the particular quarter being almost always the lower half of either the right or left portion of the field of each eye. By determining the direction of the passage of the projectile in these cases they confirm the conclusion that the upper lip of the calcarine fissure on each side corresponds to the lower half of the visual field on the other side or to the upper half of the retina on the same side, and vice versa. The reason why the upper quadrant is so seldom found to be affected lies in the fact that penetrating wounds of the inferior part of the 'area striata' are liable to produce lesions of the cerebellum which are notoriously very fatal.

2. A certain number of cases of *central scotoma* after wounds of the occiput have been observed. From the position of these, and from the fact that a central scotoma is never found in cases in which a direct injury to one or other occipital lobe can be excluded, it is argued that the macular region in each eye is represented at the posterior pole of the corresponding occipital lobe. The argument is strengthened by the occurrence of a case of 'telescopic vision,' i.e., the retention of small central fields in each eye, the entire periphery of each field being blind. This was the result of the passage of a bullet through the skull, the entrance being 2 in. above and $1\frac{1}{2}$ in. behind the upper margin of the attachment of the right pinna; the exit $\frac{1}{2}$ in. above and $2\frac{1}{2}$ in. behind the attachment of the left pinna. The bullet must have passed through the anterior part of the 'area striata' on both sides. The fact that the optic radiations must also

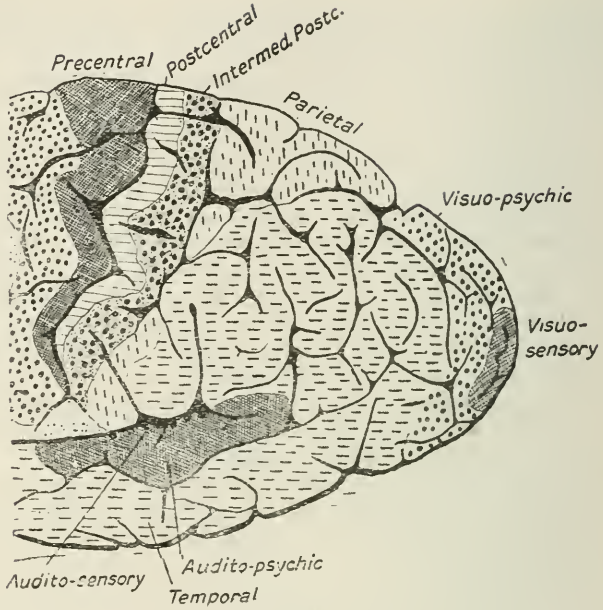


Fig. 22.

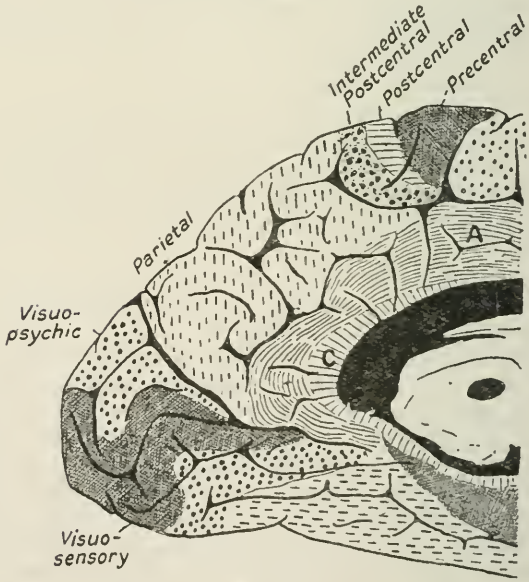
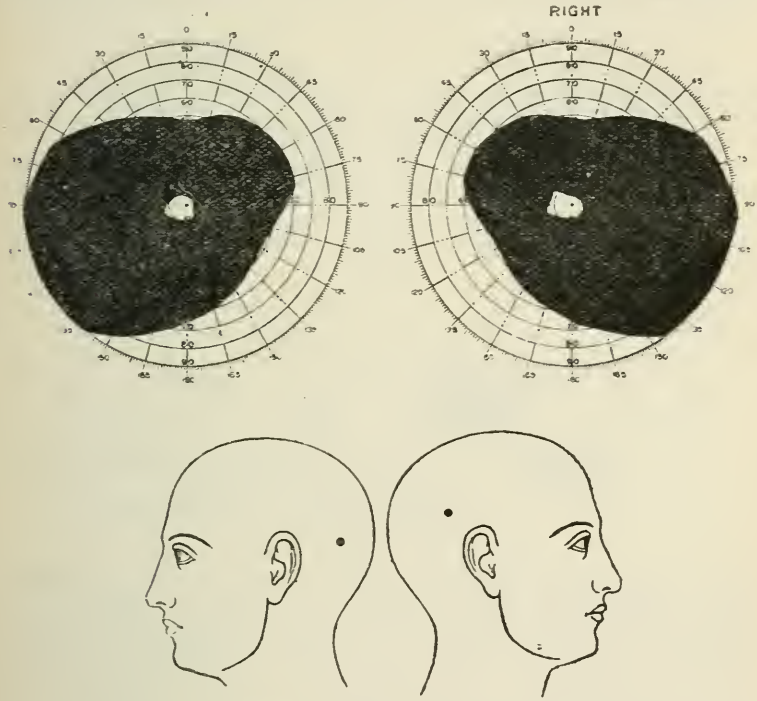


Fig. 23.

Figs. 22, 23.—The distribution of the 'area striata' (visuo-sensory) on the mesial and lateral surfaces of the hemisphere (*Campbell*).

have been injured introduces a complication into the argument ; but the fact that the posterior part of the area striata on each side was probably uninjured makes it highly probable that they bear a special relation to the central part of the field which remained intact. The case is illustrated in *Figs.* 24–26.

3. In cases of hemianopia due to wounds of the occiput, it was found in all cases that the dividing line passed either through the fixation point or within 1° of it. The more exact the methods that

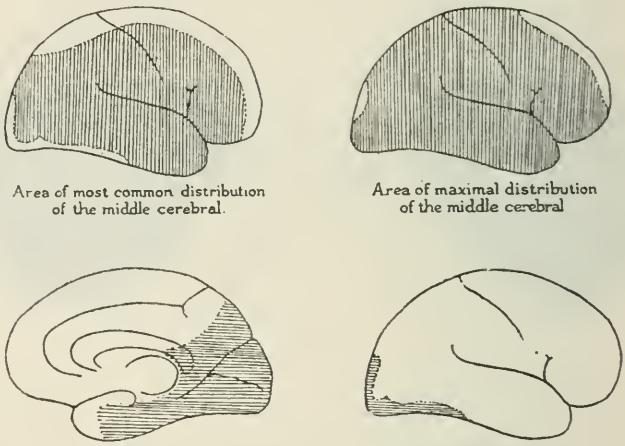


Figs. 24, 25, 26.—A case of ' telescopic vision ' caused by the passage of a bullet through the skull. (*Lister and Holmes.*)

were employed, and the greater the care taken in making the observations, the nearer did the line approach the fixation point. The authors therefore believe that in common with every other part of the retina the macula is not represented bilaterally. This may seem at first sight inconsistent with the well-known fact that in hemianopia due to vascular lesions, the macula frequently escapes. The explanation probably depends upon the vascular distribution in the region of the posterior pole. The occipital pole is usually supplied by the posterior cerebral artery, but the middle cerebral artery

extends usually to within half or a quarter of an inch of it, and occasionally actually includes it (*Figs.* 27–30). The presence or absence of macular escape in hemianopia due to vascular lesions may therefore be explained by the varying degree of anastomosis between, and the relative extent in the distribution of, the posterior and middle cerebral arteries.

The provisional conclusions of the authors on this difficult subject are as follows :—The upper half of each retina is represented in the dorsal, and the lower in the ventral part of each visual area. The centre for macular or central vision lies in the posterior extremities


Area of most common distribution of the middle cerebral.
Area of maximal distribution of the middle cerebral
Area of most common distribution of the posterior cerebral.
(from Beevor)

Figs. 27, 28, 29, 30.

of the visual areas, probably on the margins and the lateral surfaces of the occipital poles. That portion of each upper quadrant of the retina in the immediate neighbourhood of, and including the adjacent part of, the fovea centralis is represented in the upper and posterior part of the visual area in the hemisphere of the same side, and vice versa. The centre for vision subserved by the periphery of the retinæ is probably situated in the anterior end of the visual area, and the serial concentric zones of the retina from the macula to the periphery are probably represented in this order from behind forwards in the visual area.

REFERENCES.—[1]*Lancet*, 1916, i, 1217 ; [2]*Ophth. Rev.* 1916, 16 ; [3]*Bristol Med.-Chir. Jour.* 1915, 202 ; [4]*Ophthalmoscope*, 1916, 414 ; [5]*Ibid.* 1915, 435 ; [6]*Ibid.* 598 ; [7]*Ibid.* 1915, 316, and 1916, 531 ; [8]*Ibid.* 1916, 406 ; [9]*Arch. d'Ophth.* 1915, Jan., Feb. ; [10]*Pract.* 1916, i, 491 ; [11]*Lancet*, 1916, i, 620 ; [12]*Jour. Amer. Med. Assoc.* 1915, ii, 1424 ; [13]*Arch. d'Ophth.* 1915, Sept., Oct. ; [14]*Lancet*, 1916, i, 1245 ; [15]*Ibid.* ; [16]*Ophthalmoscope*, 1916, 461 ; [17]*Lancet*, 1916, i, 15 ; [18]*Proc. Roy. Soc. Med.*, Ophth. Sect., 1916, June, 57.

EYELIDS, NEW GROWTHS OF. (*See* EYE, GENERAL THERAPEUTICS.)

FACIAL NERVE, DISORDERS OF. *J. Ramsay Hunt, M.D.*

The facial nerve in most text-books of neurology and medicine is treated as a purely motor nerve, with mention of certain vasomotor, secretory, and gustatory functions. On the other hand, anatomists and embryologists have long emphasized the mixed character of the seventh cranial nerve, its sensory system consisting of the nerve of Wrisberg, the geniculate ganglion, and certain peripheral filaments. In 1909 Ramsay Hunt, in the course of a clinical and pathological investigation of herpetic inflammations of the geniculate ganglion, isolated a group of symptoms and syndromes referable to this ganglion.

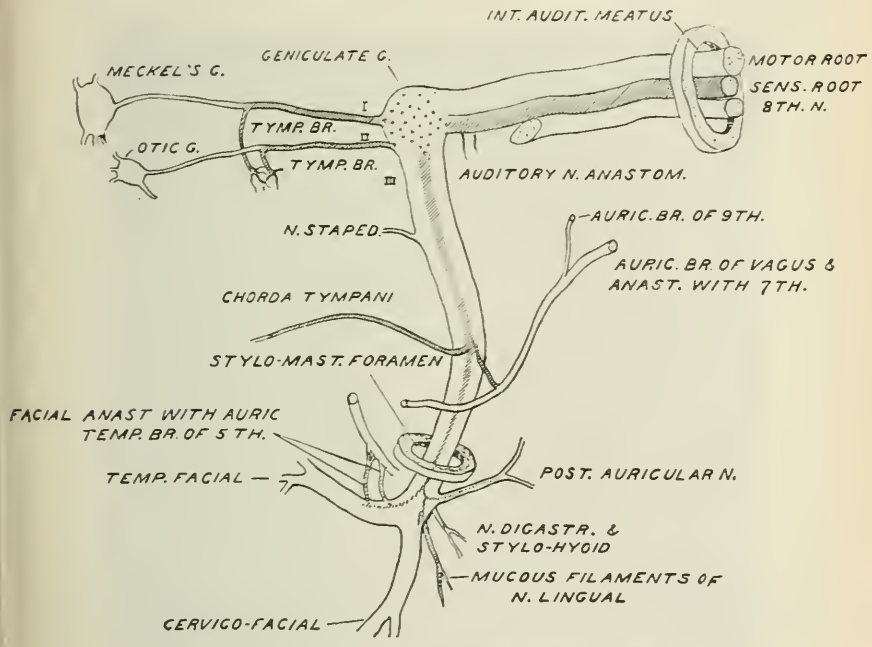


Fig. 31.—The facial nerve. (*By kind permission of* '*Brain*.')

Among the more important of these were the geniculate neuralgia (otalgia), and the syndrome of the geniculate ganglion, viz., herpes zoster oticus, facial palsy, and auditory symptoms.

In a recent contribution to *the sensory field of the facial nerve*, the author[1] still further elaborates the symptomatology of this small and not unimportant ganglion. The facial nerve is to be regarded as a mixed cranial nerve, homologous with the trigeminal, glossopharyngeal, and vagal systems (*Fig.* 31). In common with these it possesses a definite group of symptoms and syndromes directly dependent upon involvement of this sensory system. In the lower forms of life the sensory facial equals, and may even exceed, in importance the motor

functions. In man, however, the conditions are reversed—the motor function is predominant, and its sensory system has retreated before the advance of the trigeminus in front and the cervical areas posteriorly.

In comparative anatomy the facial is the nerve of the first branchial or ear-cleft, and evidences of this ancient phylogenetic relationship is still present in man, in the cutaneous innervation which persists on the external ear, as well as its relations to the other structures of the auditory mechanism which take their origin from the region of the spiracle or first visceral cleft.

Fig. 32.—Herpetic inflammation of the geniculate ganglion.
(*By kind permission of* '*Brain.*')

That portion of the facial sensory system which still persists in man is concerned in the innervation of the internal ear, the middle ear, and its prolongations into the Eustachian tube and mastoid cells, and the skin on certain portions of the external ear. There is also evidence that a vestigial remnant occasionally participates in the innervation of a strip on the posteromesial surface of the auricle and within the buccal cavity in the chorda tympani distribution, and on the palate near the anterior pillar of the fauces.

The sensory system of the geniculate ganglion has the following

symptomatology: (1) Pain and sensory disturbances in facial neuritis (Bell's palsy); (2) Certain neuralgic affections, e.g., primary tic douloureux (otalgia), reflex otalgia, herpetic and tabetic otalgia. (3) It is a sensory pathway for the direct transmission of irritative impulses to the facial nucleus, thus favouring the production of facial twitchings and spasms. (4) The herpetic inflammations of the geniculate ganglion, a syndrome characterized by an eruption of herpes zoster in the geniculate zone, usually associated with facial palsy and often with auditory symptoms (*Fig.* 32).

The cutaneous field of the geniculate ganglion is represented on one or more of the following landmarks of the external ear: the concha, external meatus, tragus, antitragus, incisura intertragica, antihelix, fossa of the antihelix, superior portion of the external surface of the lobule, within the auditory canal, and on the tympanic membrane. There is also reason to believe that the geniculate may in certain cases participate with the ninth and tenth ganglia in the innervation of a cutaneous strip on the posteromesial surface of the auricle and adjacent mastoid region. In this outline of the cutaneous zone it is not to be assumed that this entire region is exclusively innervated by the geniculate ganglion, but merely that the geniculate zone, which is variable in size and distribution, falls within this area, and that other sensory systems, e.g., the fifth, ninth, tenth, and cervical nerves, also participate.

Ramsay Hunt[2] reports a series of cases of *recurrent facial palsy* associated with pain, and considers the relationship of this type to the so-called *facioplegic migraine*. 'Recurrent' or 'relapsing' facial palsy is a term which has been used to describe a group of cases characterized by a peculiar tendency to multiple attacks or recurrences. The palsy may recur on the same side—the relapsing type—or more frequently there is alternate involvement of the two sides, which is termed 'relapsing alternating.' The individual attacks in these cases may be separated by months or years, and do not differ in etiology and symptomatology from the usual clinical types of peripheral facial palsies. The interest which attaches to them is due merely to the frequency of the occurrence in a single individual, and the underlying pathological tendencies which may favour such a predisposition. This tendency is not always confined to one member of a family, but familial and even hereditary types are sometimes encountered. The frequency of the relapsing form of Bell's palsy is much greater than is generally supposed. Remak, in a series of 200 cases, personally observed, noted a tendency to recurrence in 3 per cent, and Bernhardt, on the basis of an extensive statistical study, placed the percentage as high as 7·2 per cent.

The etiological factors are the same as those which cause the usual facial palsy with one attack, namely, the rheumatic or refrigeration palsy after exposure to cold; infections and intoxications, as diabetes, syphilis, and otitis media; and perhaps also the congenital narrowing of the stylomastoid foramen which would predispose the nerve to pressure from slight inflammatory reactions.

It is well known that severe pain is a frequent precursor and accompaniment of facial paralysis. When present it is localized in the ear and mastoid region, often radiating to the occiput and trigeminal distribution. The pain under such circumstances may be intense and persistent, and is sufficient to give rise to the suspicion of a migraine seizure in a subject afflicted with this form of headache.

The recurrent or relapsing facial palsy associated with pain in the ear and occipital region is, therefore, merely a peripheral paralysis of the seventh nerve, in which is manifested a peculiar tendency to multiple attacks or recurrences. The symptomatology corresponds in all its essentials to the more usual type in which there is but a single attack, and similar etiological factors are also in evidence.

The paralytic complications of migraine are: (1) Those of cerebral origin, e.g., hemiplegia, hemianopsia, and aphasia, following vascular lesions during the migraine seizure; and (2) Those affecting the cranial nerves, for example, the optic nerve and retina, and more especially the ophthalmoplegias. The ocular palsies are by far the most important by reason of their frequency, and at the present time they constitute a well-established clinical group, the ophthalmoplegic migraine, of which about one hundred cases have been reported in the literature. Of these the oculomotor nerve is most frequently affected, rarely the abducens, and very rarely the trochlearis. Various combinations of these ocular palsies have also been observed, and sometimes even complete ophthalmoplegia. Curiously enough, the other motor cranial nerves are not involved in migraine, with the possible exception of the facial nerve, the so-called facioplegic migraine. The basis on which this clinical type rests is a very slight one, and in the author's opinion has not been proven. What is generally accepted by many systematic writers as hemicrania facioplegica is probably nothing more than relapsing facial palsy in a subject afflicted with migraine. The Rossolimo case, which forms the chief support of this teaching, is evidently only a recurrent facial palsy with marked sensory symptoms in a woman afflicted with migraine, and one searches the literature in vain for examples of a true facioplegic migraine. If the facial nerve has any relation to migraine, which is so well established in the case of the ocular nerves, this relationship has yet to be demonstrated. The cases thus far cited do not furnish sufficient grounds for any such assumption.

It is, of course, self-evident that migraine and facial palsy, both of which are common affections, may be encountered in the same individual, but etiologically distinct.

References.—[1]*Brain*, 1915, vol. xxxviii, part iv; [2]*Jour. Amer. Med. Assoc.* 1916, i, 885.

FAINTING ATTACKS IN CHILDREN.

Frederick Langmead, M.D., F.R.C.P.

R. Hutchison cites ten examples of a condition not uncommonly met with in children, somewhat more frequently in girls. The child 'goes white' and may fall down, but does not lose consciousness

entirely, although she may be dazed or even semi-conscious. Retching or vomiting may occur, but no incontinence of urine. The attack lasts for a period varying from a few minutes to half an hour or longer, and passes off gradually. Sometimes it is followed by headache. The commonest time of occurrence appears to be in the morning before breakfast, or while the child is getting ready for school. Many of the patients are nervous or dyspeptic, but often the child appears to be in robust health. In only one case has the author witnessed an attack. On that occasion the patient, a boy, age 10, had been subject to faints for some time. When standing up to be examined he suddenly became pale and giddy, the pulse was very slow and feeble, and the heart sounds were toneless. He was conscious but confused. On laying him down he revived gradually and then flushed a little.

Hutchison thinks that overstrain at school plays a part in the etiology of this syndrome. Dyspepsia and nervousness are met with so commonly amongst the hospital class of children that their occurrence may be a coincidence.

The diagnosis is from minor epilepsy, but consciousness is not completely lost, and the duration of the attack is usually much longer than that of an epileptic seizure. An important point is that the attacks are often erroneously ascribed to heart weakness, and thus cause unnecessary alarm. In Hutchison's view they are primarily nervous in origin and due, perhaps, to a temporary sympathetic paralysis leading to uncontrolled action of the autonomic system, with vasodilatation in the splanchnic area and inhibition of the heart.

He has always found that removal from school, change of air to the seaside, and the use of strychnine as a tonic, together with attention to the digestive organs, speedily leads to their disappearance.

Reference.—[1]*Brit. Jour. Child. Dis.* 1916, 161.

FASCIA TRANSPLANTATION. *W. I. de C. Wheeler, F.R.C.S.I.*

Free flaps of fascia have been transplanted with success, mainly from the fascia lata of the thigh, to fill defects in the abdominal wall in hernia operations, and to prevent bony union in the operation of arthroplasty. As a means of preventing re-formation of adhesions between tendons, nerves, etc., fascia flaps are unsuitable, and not to be compared with combined fat and fascia obtained from the abdominal subcutaneous tissues.

Phemister[1] recommends fascia transplantation in the treatment of old fractures of the patella. In a successful case he bridged over the defect between the fragments by a free fascia flap taken from the middle of the thigh.

Reference.—[1]*Ann. Surg.* 1915, ii, 746.

FAT EMBOLISM. *Herbert French, M.D., F.R.C.P.*

Fat embolism, noted by Zenker and others in 1862, was first accurately described by von Recklinghausen in 1864. His account was founded on the case of a man who died of fat embolism of the brain a

few hours after being kicked by a horse on the shin; the conclusion come to after investigation being that the escape of blood into the marrow of the injured bone had driven the fat into the veins. During the last fifty years the condition has often been noted. It has been seen to follow mechanical shock or concussion without the fracture of bone, although the traumatic or operative fracture of bones remain its commonest cause. It is also said to occur frequently as a complication of osteomyelitis, and in diabetes mellitus. It has been noted exceptionally in a number of medical conditions, such as lobar pneumonia, burns, endometritis, senile marasmus, anthrax, and in poisoning by phosphorus, potassium chlorate or bichromate, or alcohol, in which there is no obvious cause for its appearance.

Recently, Nicolai[1] found elongated droplets or 'snakes' of fat in the pulmonary vessels of 8 out of 57 cadavers; all had died of phthisis, heart disease, or renal disease, without trauma or osteomyelitis. He notes that the occurrence of occasional droplets of fat in these vessels must be regarded as normal, quoting the experience of Cornil and Ranvier, who found similar droplets in the pulmonary vessels of 18 out of 20 normal dogs. As these authors point out, the difference between the physiological and the pathological here must be one of degree only.

It is generally stated that fat embolism may be fatal through either the lungs or the brain. Nicolai quotes a case of his own in which fat embolism of the brain was the cause of death. The patient, a man, age 40, was struck on the chest and leg by a falling beam. He sustained fracture of the left tibia and multiple fractures of ribs, but lost consciousness for only a moment. Next day his temperature, respiration-rate, and pulse-rate rose, and he became mentally dull; the day after he died comatose, the temperature rising to 104°, the pulse to 116, the respirations to 40. At the post-mortem examination, fat was found in the vessels of the glomeruli and the capillaries between the renal tubules; the heart also exhibited fat embolism and parenchymatous degeneration of the muscle fibres. The brain presented highly characteristic appearances. The centrum ovale on section showed numerous small hæmorrhages which under the microscope displayed small vessels plugged with fat and surrounded with extravasated blood and necrotic white matter. The grey matter was free from these hæmorrhagic and necrotic areas—a fact which Nicolai explains by saying that the grey matter has a better blood-supply than the white. The foramen ovale of the heart was closed; and Nicolai draws special attention to the fact that his case shows that it is possible to have fat embolism of the greater circulation without the occurrence of paradoxical embolism, or the transit of fat emboli from the right to the left auricle through a patent foramen ovale. He believes that the fat reaches the circulation directly by way of the veins, but notes that it may also be picked up by way of the lymphatics and be poured into the circulation through the thoracic duct. He is of the opinion that the small and frequent pulse and the

precordial pain noted in some instances of fat embolism may really be primary heart symptoms from blocking of cardiac arterioles and capillaries.

Fat embolism has been made the subject of numerous experimental investigations, such substances as olive oil or melted lard having been injected into the veins of the experimental animals. Among these investigations is that published last year by Maccagno.[2] It has been found that death follows if fat to the amount of about 0·2 per cent of an animal's weight is injected into one of its veins. The fat is eliminated very slowly, partly by saponification and absorption, partly by excretion in the urine. Maccagno's experiments were made with lard and olive oil on rabbits, with the object of ascertaining, first, the size of the fatal dose, and, secondly, of determining the length of time required for the absorption of the emboli. He concludes that 0·1 per cent of the animal's weight generally constitutes a fatal dose ; but considerable individual variations were noted here, up to 0·2 per cent of the body weight being tolerated in a few instances. The fat is disposed of slowly after injection. If small amounts are injected daily, death occurs when 0·1 per cent of the body weight has been injected, but if the injections are made every four days, death is not caused until the quantity of fat injected amounts to 0·136 per cent. Even forty-one days after an intravenous injection, fat emboli may be found in the lungs and kidneys, with more or less extensive infiltration with small round cells and fat-containing cells around the occluded vessels, and interstitial hæmorrhages. Maccagno concludes that fat embolism is a cumulative process, a point that ought, perhaps, to be kept in mind in the treatment of comminuted fractures of bones and the like. He does not specify very clearly the exact cause of death in his experimental animals. Recovery after extreme dyspnœa was sometimes noted, as if great embolic obstruction to the passage of blood through the lungs was not necessarily fatal. It may be added that fat embolism in human beings is said to be fatal by means of pulmonary obstruction in a little more than half the cases. Almost all Maccagno's animals died in convulsions, and showed fat embolism of the brain and heart on section ; at the same time, the right ventricle displayed considerable or extreme dilatation, and œdema of the lungs, which was roughly proportional to the amount of fat injected, with areas of pulmonary infarction. He is, in fact, unable to determine to what extent fat embolism of the lungs, the heart, and the brain are respectively to be held responsible for death in fat embolism.

The conclusion he draws is, that patients with fractured bones should be kept as quiet as possible for several days before any operative treatment of their fractures is undertaken, in order that the injured vessels in the bones may have time to become thrombosed ; in this way the danger of further fat embolism may be minimized.

References.—[1]*Nederl. Tijds. v. Geneesk.* 1914, ii, 1605 (abstr. in *Brit. Med. Jour.* 1916, i, 625) ; [2]*Policlinico, Sez. Chir.* 1915, xxii, 209 (abstr. in *Brit. Med. Jour.* 1916, i, 625).

FAVUS. (*See* RINGWORM.)

FEEBLE-MINDED, THE CARE AND TRAINING OF.

David McVea Fleck, M.B., B.Ch.

Before April 1, 1914, when the Mental Deficiency Act of 1913 came into operation, many mental defectives were controlled, well cared for, and more or less successfully trained, up to an age not exceeding sixteen years, when the law allowed them to become free subjects, disregarding the fact that they were not capable of self-control; and for these it was often found that "the last state was worse than the first," since knowledge which is increased out of ratio with self-control is dangerous.

With the new legislation we are now able to continue and even make training and supervision compulsory, as long as it is necessary. *It should be clearly understood that the law now makes it compulsory that all mental defectives must be registered, cared for, controlled, and trained;* but as long as this is carried out to the satisfaction of the Board of Control, they may be treated in their own homes or in private institutions.

Any practitioner may be called upon for advice in these cases, and when asked with reference to Institutional treatment he should know: (1) *What cases should be sent to an Institution;* (2) *How and where to send them;* (3) *Something of what is done for them in Institutions;* (4) *Some guiding principles to enable him to form a prognosis as to the probable result of treatment.*

1. What Cases should be sent to an Institution.—There is no compulsion, and no need of compulsion, to send any case which is already provided for satisfactorily.

The law is for those who are unprovided for and require help, and every case which comes under the definitions given below should have a chance of training, and be placed in an institution suitable to his or her grade of mental capacity; it is of paramount importance that a child should be sent to a Training Institution as soon as it shows evidence of mental defect, as often the best chances are wasted by delay. The parents think the child "will grow out of it," and so allow it to run wild, contracting evil habits and vicious circles, which take years of training to eradicate, and sometimes permanently mar its progress. Such a child has but little resisting power to evil temptations, little or no self-control, is easily excited, impulsive, and may be dangerous.

Now we welcome the legislation which rightly considers his weakness and peculiarities not to be due to any fault of his own, and provides the best training and development to enable him to grow up self-governing and law-abiding.

For the purposes of the Mental Deficiency Act the following classes have been defined:—

1. *Idiots.*—Persons so deeply defective in mind from birth or from an early age as to be unable to guard themselves against common physical dangers.

2. *Imbeciles.*—In these cases there exists from birth or from an early age mental defectiveness so pronounced that they are incapable of managing themselves or their affairs, or of being taught to do so.
3. *Feeble-minded.*—There are persons in whom there exists from birth or from an early age mental defectiveness not amounting to imbecility, yet so pronounced that they require care, supervision, and control for their own protection or that of others; or, in the case of children, that they appear to be permanently incapable of receiving proper benefit from the instruction in ordinary schools.
4. *Moral Imbeciles.*—That is, persons who from an early age display some permanent mental defect coupled with strong vicious or criminal propensities on which punishment has had little or no deterrent effect.

To enable us to classify for purposes of training we have many standards. For example:—

a. Mental Capacity.—Some are more educable and some less.
b. Physical Fitness.—Some are strong and well developed in every limb, while others are permanent cripples or invalids.
c. Docility.—Some are docile and inoffensive, and some have depraved habits, while others require constant supervision and at times restraint.
d. Age.—This has its influence in our classifications. Generally speaking, children would be sent to a separate Institution from adults; nevertheless certain selected adults go well with children, and children again may sometimes with happy results be allowed to form part of a selected adult Institution; many feeble-minded girls take a keen interest in children, and provide for their wants in a motherly manner, which serves as a useful training for themselves.
e. Sex.—The sexes should be separated early; the sexual instinct is often precocious and perverted in the mentally defective.

2. **How and when to send Cases which are considered suitable for Institutional Training.**—The Act has not yet been in operation for three years, and our work has been impeded by the great war which still rages; we are therefore compelled to work with a somewhat limited number of Institutions, most of which are overcrowded, and classification in the first instance is attempted by correspondence, and the filling of prescribed forms and history papers, instead of through an observation centre.

There should be little difficulty as to how and where to send. Application is made to the central bureau. The case is accepted and located after classification.

The work is organized usually by Borough or County Councils, or Education Boards, who appoint a local committee to see that the work is carried on as the law directs. Every medical man should be acquainted with the working of the committee responsible for his

area or district, and the channel through which he can communicate with the Board of Control, 66, Victoria Street, Westminster, about any case which may come before them.

An inquiry from any part of the Kingdom addressed to the Warden, The Incorporation of National Institutions for Persons requiring Care and Control, 14, Hawick Place, Victoria Street, Westminster, London, would be answered, giving the procedure applicable to any particular town or district. All offices work under the Central Board and subject to their approval. Local committees will make their arrangements as to payment for cases, in conjunction with the Government grant, and to meet cases where the parents are unable to pay.

Classifications are mainly relative, not absolute, as roughly all classes may be considered as links in the chain which extends down the scale from perfect sanity to amentia.

3. **The Nature of the Training and Treatment in Institutions.**—When a case is presented with authority for admission, a thorough examination is made both of the physical and mental condition, and comparison made with that of a normal child, the findings being entered in the case register for reference and to enable the progress made to be gauged. All abnormalities, deformities, or noticeable peculiarities are noted. Sometimes it is difficult to elicit enough information at one examination to determine the mental standard, which usually is expressed in the form of a fraction, the numerator representing the age of a normal child of the same mental capacity, and the denominator the age of the child under examination. Thus a child of thirteen years showing intelligence only amounting to that of a normal child of seven, has his mental formula put down as $\frac{7}{13}$. Afterwards the child is seen daily for three weeks, and in this way many tests of intelligence and capabilities can be made which are impossible at a first interview, when the child is nervous and shy. A record is made of the progress and state of each child, at least quarterly.

It has been the experience of many who have studied the development of such children, that intellectual attainments do not as a rule reach a proportionate degree of perfection with physical acquirements and routine practices; in other words, a child will often learn to do what it has seen done, but fail when the faculty of reasoning is called into action.

The great principle which pervades our system of training is one of natural simplicity. "Back to the land" is one of the key-notes. Life in the open air is our watchword, and during the summer the inmates are out of doors practically all day. In winter, the treatment must be somewhat modified, since most mental defectives bear cold and inclement weather badly, and such cases may often droop or pine without even suggesting that they feel cold or discomfort.

A healthy, natural routine of life, avoiding all excesses, is best. Early to bed and early to rise, wholesome food—plenty of vegetable and limited animal—and cleanliness combined with comfortable clothing, are guiding principles.

4. **Prognosis.**—On the whole, the education and training of the feeble-minded is both interesting and encouraging when we see the progress which can be made, but it is disappointing if a high percentage are expected to become normal members of society. Prognosis is mainly in the inverse ratio to the amount of mental defect; thus: much defect little hope, little defect much hope. The dictum, "Once an idiot always an idiot." is still correct; yet it may be said that few cases are without hope of improvement, especially when training is commenced at an early age.

Of the higher grades many, perhaps 50 per cent, when trained early and up to adult life, are capable of earning their own living under supervision; but probably not 10 per cent ever become capable, unaided, of finding and retaining situations and spending their earnings prudently. A large percentage improve up to a certain stage, and then become stationary; and some of these at an early age begin to go back, as if the nerve-cells had reached their limit of attainment, and then begin to degenerate, suggesting a premature senile decay.

For a large percentage of the least hopeful cases the best that can be promised is, that they may become happy colonists, innocent of many of the outside world's vices, and that they may be shielded from the pitfalls of life against which they are unable to guard themselves.

Medicine and surgery have their limitations here as in other directions. We all know how hopeless it is to repair degenerated nerve- and muscle-cells where these have lost their function; but where these never existed it is idle to expect repair. Yet there are cases where the physician and the surgeon can foretell very marked improvement. For instance, the epileptic from traumatism may be cured by a timely operation, and where adenoids are the cause, the surgeon can often effect great improvement. For the cretin the administration of thyroid extract works one of the most rapid and marvellous improvements which can be claimed by the physician within the whole range of therapeutics.

Alienists usually draw a line between those who are weak-minded because their faculties have never been developed, and those who have lost normal faculties they once had. From a prognostic point of view the former, or congenital cases, which usually show some physical abnormalities as well as mental defect, are more hopeful than the latter. Or in the words of the late J. Langdon Down, "The prognosis is, contrary to what is so often thought, inversely as the child is comely, fair to look upon, and winsome." As a broad principle this is correct, yet it is often difficult to persuade the fond mother that her 'beautiful child' is not mentally normal and 'will never grow out of it.'

A family history of epilepsy or insanity, other things being equal, is unfavourable, and on the other hand a good family history is on the side of a favourable prognosis. Head measurements may be of some guide in prognosis. A head under 18 inches in circumference

usually denotes a very low grade not hopeful of much improvement.

The Mongolian or Kalmuck (one of the most interesting types) can in many cases be improved ; but the ultimate outlook is not hopeful ; such children are usually delicate, and frequently die from some intercurrent disease.

In cases due to congenital syphilis the prognosis is not good. Sometimes at the advent of puberty these cases develop infantile general paralysis and die in a year or two.

Cases due to birth palsy, except where epilepsy is a complication, are usually good from a mental point of view, although the paralysis is usually permanent. (*See also the List of Licensed Institutions later in book.*)

FLATULENCE AND METEORISM. *Robert Hutchison, M.D., F.R.C.P.*

Einhorn[1] defines flatulence as gas which is easily got rid of; meteorism as a condition in which there is an accumulation of gas in the stomach or intestine which is not easily got rid of. Most cases of gastric flatulence are due to air-swallowing, combined, perhaps, with diminished absorption owing to lessened pressure in the stomach. Flatulence due to fermentation is rare.

The treatment of air-swallowing consists in simply suppressing the coming up of the gas. The patient must be told not to try to bring it up. Further, such patients should not be put on a diet, but should have a liberal amount of food without restrictions. Nerve sedatives such as **Bromides** and **Valerian** are of help. When the flatulence is due to fermentation, the treatment is that of the primary disease. Even in these cases carbohydrates should not be entirely withheld. It is better merely to limit them or to allow them in ordinary amounts, and to give **Alkalies** and **Diastase** to lessen acidity and help digestion. Intestinal flatulence may also be due to purely functional disturbance in which there is apparently a diminished absorption of gas. This should be treated in the same way as air-swallowing, the patient being encouraged to suppress the tendency to expel the flatus. Often cases are due to impaired digestion of starches, which is recognized by the passage of undigested starch in the stools. In such cases starch in the diet should be limited, but not altogether withheld. More rarely the flatus is due to imperfect digestion of proteins, which can be recognized by the passage of muscle fibre in the stools. Here, animal foods should be restricted and intestinal antiseptics administered.

Meteorism also may be functional and due to a spasm or paralysis in some part of the alimentary tract, or, more frequently, it is the result of organic obstruction. As the diagnosis between the two varieties may be difficult, prognosis should be guarded. In the treatment of functional meteorism the best remedies are **Atropine** (gr. $\frac{1}{60}$ once or twice daily) and **Valerian.** A stomach tube may be passed, or the intestine irrigated with a quart of water containing a teaspoonful of essence of peppermint. If there is the least suspicion of organic obstruction, operation should be performed.

REFERENCE.—[1]*Med. Press and Circ.* 1916, ii. 101.

FOOT, WOUNDS OF.

Le Tanneur recommends the soaking of the feet in a solution of **Sulphide of Potash** (*p.* 29).

FOOT-AND-MOUTH DISEASE. *E. Graham Little, M.D., F.R.C.P.*

This is a highly contagious disease among susceptible animals, but comparatively seldom seen in man, and the careful and beautifully illustrated article by Clough[1] is an important addition to our information on the subject. It is a systemic disease, caused probably by an ultramicroscopic organism which passes a Berkefeld filter. The virus is present in the fluid of the vesicles which constitute the eruption, and in the circulating blood, the saliva, urine, fæces, and milk. It is readily destroyed by light, heat, drying, and disinfectants, but may survive for long periods if kept cool and moist.

Between 1887 and 1897, 600 human cases were officially reported in Germany. The disease may be contracted by direct contact with infected cattle, or by the ingestion of infected animal products—cream, cheese, milk, and butter. The symptoms are similar to, but milder than, those observed in cattle. The incubation period is from two to ten days, the initial symptoms including moderate fever, general malaise, prostration and a feeling of dryness and burning in the mouth. The mucosa becomes deeply injected and painful, and, after two or three days, vesicles develop in the mouth and nose, and on the conjunctiva and the skin in the neighbourhood. There may be swelling of the mucosa and skin, and salivation is free. The vesicles are small, from 2 to 10 mm. in diameter, but may coalesce to form large blebs. They contain a clear or slightly cloudy fluid, and rupture in a few days, forming superficial deeply-injected, very tender ulcers, which usually heal rapidly without scarring. With the appearance of the rash the fever and constitutional symptoms subside. In the severe cases the eruption attacks the hands and feet, the genitals, and nipples, and may, but very rarely, spread over the whole body. Secondary infection of the ulcers on fingers and toes may lead to loss of the nails. Besides the vesicles, petechiæ are not infrequent. Children are more subject to the disease than adults, and serious constitutional symptoms may be present, such as high fever, severe abdominal colics and pain, with vomiting, diarrhœa, and bloody stools. Such cases may end fatally.

Experimental inoculation from human virus has produced the disease in calves, and a German observer developed the disease in himself by drinking infected milk.

Sutton and O'Donnell[2] report a case which was probably of this nature, but conclusive identification with it was not made. Experimental inoculation in a kitten was followed by its illness for twenty-four hours, but there was no production of rash on skin or mucous membranes. Cultures from an unbroken vesicle grew, besides the usual staphylococci, a hæmolytic streptococcus.

Treatment is purely symptomatic, and includes mouth-washes of **Potassium Permanganate** and **Chlorate,** and the application of lotions to relieve the itching of the skin.

Reference.—[1]*Johns Hop. Hosp. Bull.* 1915, 331; [2]*Jour. Amer. Med. Assoc.* 1916. i. 947.

FOREIGN BODIES, LOCALIZATION OF. (*See* Radio-activity and Electrotherapeutics.)

FRACTURES. *W. I. de C. Wheeler, F.R.C.S.I.*

Most surgeons have abandoned the practice of introducing plates and screws in the presence of sepsis, and thus avoid the frequent extensive necrosis, non-union, and mal-union likely to follow in the wake of such treatment. Any temporary comfort to the patient and immediately good results are misleading as a rule, and the price paid is too high. The majority for the most part follow also the teaching of Robert Jones, in discarding the use of plaster-of-Paris as a method of fixation, unless it is very specially indicated.

Hey Groves[1] writes fully on the question of gunshot fractures. He deals with problems not yet wholly solved, and discusses only fundamental principles. With the exception of the clean through-and-through bullet wound, every wound should be excised and foreign bodies be removed. This is a satisfactory procedure if carried out within forty-eight hours. In later cases the only safe rule to pursue is to open up all those wounds about which there is any doubt. The whole track of the wound should be laid open down to the bone, and left widely gaping so as to be independent of tubes or wicks for drainage. For example, in the thigh, an incision between the vastus externus and the biceps, with a partial transverse division of both muscles, leaves a wound which automatically gapes by muscular contraction. Loose gauze packing, with the addition of salt bags or tablets, and tubes for irrigation where necessary, is a good dressing. If there is a deep pocket, a tube introduced may leave a troublesome sinus, and gauze packing may be painful and difficult.

The attempt to save shattered limbs may be carried too far; lives have been lost which might have been saved by timely amputation. Such cases are usually injuries of the femur and humerus with concurrent infection of the joints, cases of secondary hæmorrhage, and wounds of the thigh which could not be fully laid open, with loss of a large portion of the femur, associated with severe infection. The danger of delay is greater in the case of septic fractures above the elbow and knee than in those below these joints. In desperate cases the wound should be opened up at all costs by a transverse incision, and amputated later if necessary. By doing it thus, in two stages, shock and sepsis are diminished, and there is always a possibility of recovery without amputation.

Hey Groves thinks that if 4, 6, or more inches of the bone are lost in fractures of the thigh, and the ends of the bone appear bare in the wound, and in addition there are manifest signs of septic absorption,

it is well to amputate, considering that the most to be expected is a flail-like thigh six inches shorter than its fellow. On the other hand, in a similar case showing rapid healing of the wounds with general health and vigour retained, it is worth waiting for a future bone-graft.

[Some cases with great loss of substance of the femur from gunshot wounds, recover with little shortening, and with an astonishing amount of regeneration of bone, in the presence of bad sepsis, if the limb is kept extended and the wounds remain freely open. Continuous irrigation or the employment of Carel's tubes is indicated in such cases. The writer has seen 4 inches of femur replaced by osteogenetic processes in a limb merely hanging on by the soft tissues which contained the vessels on the inner side. The patient recovered with an inch shortening, and only inconvenienced by ankylosis of the knee-joint.—W. I. de C. W.]

Groves rightly emphasizes that a bullet should not be removed simply because it is shown on an *x*-ray plate, unless it is keeping up infection. On the other hand, pieces of shell should not be left in a septic wound until localized in home hospitals, as delay often produces acute and even fatal sepsis. The *x* ray should be our servant, and not our master, in the treatment of gunshot wounds.

This author rather deprecates the use of Thomas's splint and its modifications in cases of thigh fracture, and in this respect is at variance with most observers. He urges that with weight extension the limb is from the very outset kept with all the joints semi-flexed—the best position of physiological rest—and if the hip, knee, and ankle are kept free from bandage or strapping, movements can be carried on throughout the treatment. It is further stated that if, instead of indirectly pulling on the bone by plaster attached to the skin, direct traction is made on a pin piercing the bone, many of the disadvantages of adhesive strapping are overcome. The method is less painful to the patient, and causes less soreness of the skin. The pin can be placed through the head of the tibia for fractures of the femur at the lower end. Transfixion of the tibia at the level of the tubercle perforates nothing except skin-connected tissue and bone. The pin may be left about eight weeks *in situ*.

Groves, like most other recent writers, is convinced that the study and practice of accurately applied extension methods leaves very little scope for open operations in war surgery. A mal-united fracture of the femur of three months' standing may require a 200-lb. pull to correct the shortening at one sitting; but the same thing can be accomplished by a 25-lb. weight acting on a transfixion pin for one week. An open operation, if the wounds are healed, can then be accomplished without undue labour or anxiety. If the ordinary plates and screws are used in such cases, the transfixion pin should be retained and a weight of 10 lb. be left for a further five weeks after operation.

Gilbert Arnold[2] deals with the difficulties in the treatment of severe gunshot injuries of the upper arm, elbow, and forearm. He recom-

mends an apparatus (*Figs.* 33–36): (1) To immobilize the part so as to secure the fragments in good position; (2) To allow easy access to the wounds for irrigation and dressing; (3) To allow movements of the patient in bed without pain. He describes the apparatus as follows:—

A rectangular plate about 45 by 38 cm., usually a plate of perforated aluminium 4 to 5 mm. in thickness (*vide Figs.* 33 and 34), is employed. This plate, splint, tray, or supporting appliance can be fashioned from other material than aluminium, provided the material selected is non-absorbent, readily cleaned, sufficiently rigid not to bend in use, and light in weight. *Fig.* 36 is a drawing of a plate made from sheet vulcanite fibre, set in an aluminium frame to give the necessary stiffness.

Fig. 33.

Figs. 33 to 36 illustrate Arnold's appliance for use in injuries of the arm.
(*Redrawn from* '*The British Medical Journal.*')

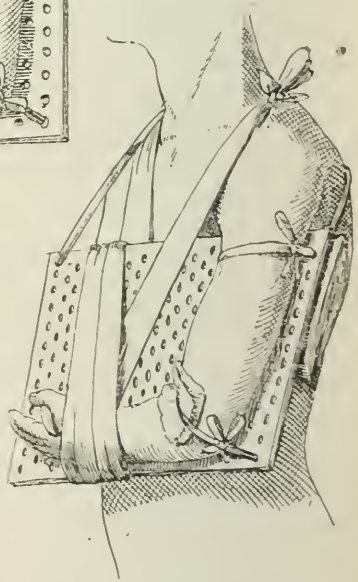


Fig. 34.—Side view of *Fig.* 33.

Originally I used to fasten the arm to the perforated splint by means of flexible aluminium hooks moulded to the contour of the arm, the hooks being fixed in the plate by screwing on small nuts underneath the plate to their reduced projecting ends. In *Fig.* 33 a hook of this kind is seen between the thumb and index finger.

Figs. 33, 34, and 35 are drawings made from patients. *Fig.* 33 is that of a compound comminuted fracture at the upper and middle

third of the shaft of the humerus, communicating with large discharging wounds on the inner and outer side of the arm. The sketch shows the usual way in which the arm rests upon the splint. It will be

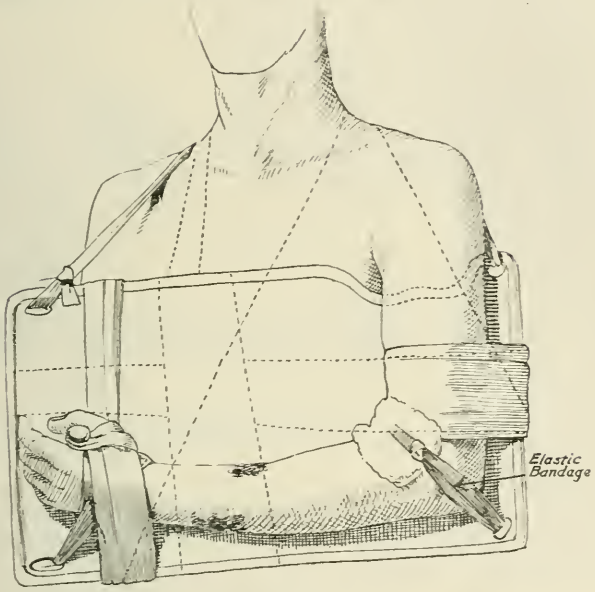


Fig. 35.

noted that one corner of the splint is fitted close into the axilla, and here the upper arm is secured to the plate by means of a fold of gauze passing through holes in the plate on either side of the limb just below the shoulder. Extension is obtained in part by the weight of the limb below the fracture, but is assisted by the tension of the pad and band at the bend of the elbow, which secures the arm to the lower posterior corner of the support. At this point I often employ an elastic band, but frequently a strip of ordinary bandage suffices. The hand and forearm are maintained in a position midway between pronation and supination. As shown in *Fig.* 34, a cushion in the axilla is interposed between the splint and the thorax, the cushion

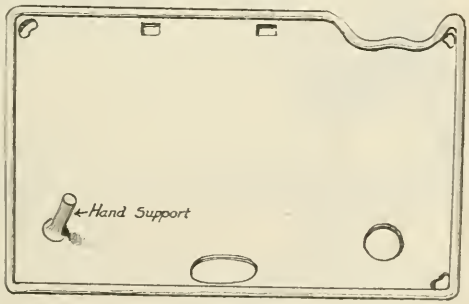


Fig. 36.

being kept in position by attachments which pass over the opposite shoulder. The plate and limb together are well slung up, as indicated in the drawings, and in the early stages of very severe injuries the patient should be in bed with the splint in an inclined position resting on a firm pillow. If there is a wound on the surface of the limb towards the plate, the latter should be fenestrated at the corresponding area, in order to allow the necessary frequent dressings to be done without removing the injured member from its supporting splint.

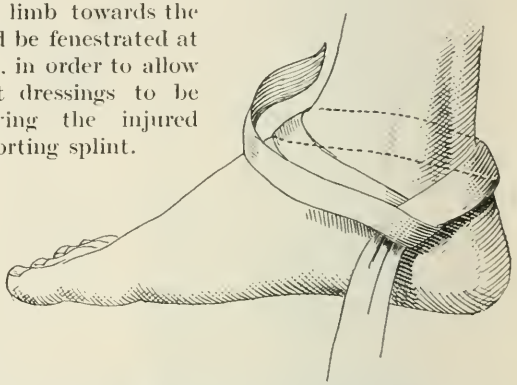


Fig. 37.—Traction bandage for reduction of fracture of the leg (Howard Collins). First turn, seen from inner side.

In the case of fractures of the forearm with shortening and displacement of the fragments, the splint is applied in the way already described, but extension and counter-extension will be required, and the splint affords an efficient and easy means for this. The hand is to be firmly and comfortably attached, using a starch bandage, to the post shown in *Figs.* 35 and 36, or alternately a bracelet of gutta-percha fastened to the plate is made to encircle the wrist. The upper arm is then pulled directly backwards, and the elbow backwards and downwards, as shown in *Fig.* 35.

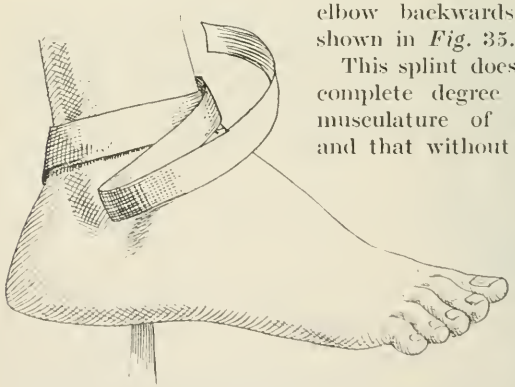


Fig. 38.—Traction bandage. Second turn, seen from outer side.

This splint does, in fact, afford a very complete degree of rest to the entire musculature of the upper extremity, and that without being burdensome by any exaggerated restraint imposed, for whilst it provides very perfect immobilization, it opposes little restriction to movements of other parts of the body—a point on which the comfort of the patient depends so much.

I can confidently recommend this simple appliance as an instrument giving great comfort to the patient, and a great control of the situation to the surgeon. It enables the surgeon to apply correcting forces in any desired directions to meet the exigencies and

special deformities of each particular case, for the margins of the plate and the perforations are so many fulcra for the effective application of power.

Grossman[3] deals with the question of fractures in children. His summary and conclusions are: (1) In treating fractures in children and infants, bear in mind the tender skin, the round agile body, and the movable cover of fat which envelops the soft bones. (2) An incomplete fracture of the fissure or the torsion variety may be sub-periosteal and difficult to diagnose. The most constant sign is the localized bone or 'pencil tenderness': the line of maximum tenderness can be mapped out by the rubber tip of a lead pencil, and by this method the line of fracture traced and the diagnosis made. The tenderness is very great. (3) In children the time of union is much shorter. (4) If a child after an injury refuses to use a limb, bear in mind the possibility of fracture. (5) Proper attention is only second in importance to proper reduction. (6) Early massage, and passive and active movements, are very important in securing satisfactory results.

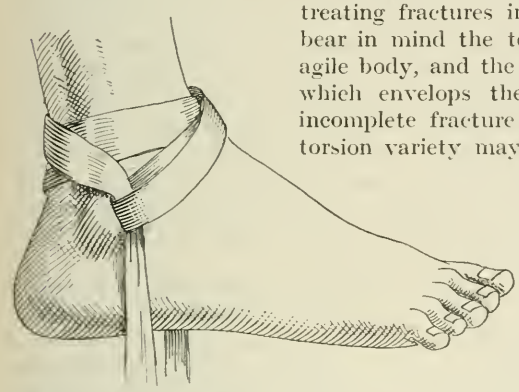


Fig. 39.—Traction bandage. Completed bandage, seen from outer side.

Howard Collins[4] describes a traction bandage for reduction of fracture of the leg. The writer experienced great inconvenience by the assistant having to let go with one hand or the other at every turn of a plaster bandage about the ankle or foot. The bandage recommended, unlike the common 'hitches,' does not come too far forward on the foot, and keeps in line with the long axis of the leg. The materials used are stout canton flannel bandage 3 in. wide and 2 yards long; two pieces of felt, one 6 in. and the other 4 in. long, both $\frac{1}{4}$ in. thick and 4 in. wide, the longer pieces being laid across the front of the ankle and instep, the other over the tendo

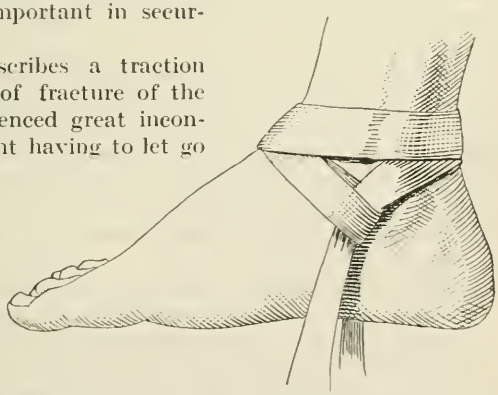


Fig. 10.—Traction bandage. Completed bandage, seen from inner side.

Achillis to prevent discomfort from the pull. The bandage and felt are incorporated in the plaster bandage. (*See Figs.* 37–40.)

Bland-Sutton[5] states that he never saw a compound comminuted fracture of the head of the humerus until the present war supplied him freely with examples. In each case the fragments of bone were removed and the wound was freely opened and drained. The long tendon of the biceps should be preserved—it is often spared by the bullet. Bland-Sutton deprecates the practice of leaving septic and necrotic pieces of bone in the wound with the hope that they will amalgamate. When the shaft of the bone immediately below the head has been extensively comminuted, he believes that the head of the humerus should be removed. In the early months of the war he removed the fragments of the shaft and left the head *in situ*, hoping that when sepsis subsided the breach might be repaired by plating or grafting. This in practice proved unsound.

Hey Groves,[6] in an analysis of sixty consecutive cases of gunshot fractures of the femur, reaches the following conclusions :—

1. The treatment of gunshot fractures of the femur requires that the limb shall be immobilized at the earliest moment, and that this immobilization shall be such as not to interfere with frequent dressings.

2. These conditions are best carried out by a wire cradle sling splint constructed on the principles of the double inclined plane.

3. When the wounds have been thoroughly opened and drained by judicious transverse openings, and have taken on a healthy character, weight extension should be applied and maintained until union is firm.

4. Whilst weight extension can be applied by adhesive plaster or by transfixion, the latter is by far the more reliable, but is attended by certain risks of septic infection of the soft tissues, and particularly of the knee-joint.

5. When treated on the above principles, the results are as follows : Loss of life, 10 per cent ; loss of limb, 6·6 per cent ; good form and function in limbs saved, 74 per cent ; delayed union, 16 per cent ; delayed healing, 6 per cent ; deformity, 4 per cent.

6. The most important factor in the determination of the above results is the presence and degree of sepsis.

7. Comminution, apart from sepsis, is no hindrance but rather a stimulus to rapid union.

8. The removal of pieces of comminuted bone is unwarranted, and is the most potent cause of non-union.

9. Whilst all types of metal sling splints may give good results, those which, like the Thomas, require a fixed ring round the thigh of the broken leg, should only be used for transport—if the wire cradle splint is not available ; for the thigh ring becomes soiled by fæces and wound discharges, and is a source of great discomfort to the patient.

10. Whilst the Hodgen, the Balkan, and the wire cradle splint all are correct in their principle of holding the leg in a position of semi-flexion of the hip and knee, only the last is self-contained and can be

used for transport ; and further, it gives greater facilities for massage and movements than the other.

11. The position of flexion of the thigh entails the risk of encouraging pus to track up the limb ; but this can be prevented by thorough opening of the infected area ; or, if not prevented, it must be met by the use of a hinged splint which keeps the limb horizontal except for dressing, when it is elevated by a strut.

In the same article, Groves recommends the horseshoe screw clamp for applying extension (*Fig.* 41), and describes its use as follows : "In a few cases of fractured femur I have used certain modifications of the simple transfixion method. The horseshoe screw clamp is a device in which two pointed screws, held by a metal horseshoe, are driven into the outer and inner aspects of the condyles for about a quarter of an inch, not penetrating the entire thickness of the bone. Its advantages are, that it can be easily applied under local anæsthesia, it only makes a superficial wound of the bone, and in cases of a vertical split between the condyles it clamps the latter together. This last is the only indication for which I now employ it, and it is then very efficient. The idea that it avoids the danger of septic infection involved by transfixion is only partly true, because, though the interior of the bone is not opened, there still remain the skin wounds by which sepsis may gain access to the connective tissue of the thigh."

Fig. 41.—Hey Groves's horseshoe screw clamp for grasping a bone without transfixion. (*From 'Modern Methods of Treating Fractures.'—Hey Groves.*)

Arbuthnot Lane[7] discusses the operative treatment of fractures in warfare. He states that it is rarely advisable, in the presence of very septic conditions, to attempt to fix the fragments by means of plates and screws, although there is a great temptation to produce immediate immobilization and consequent freedom from pain. In a large proportion of cases, wide necrosis follows the introduction of foreign bodies for fixation purposes. Non-union, imperfect union, or very considerable shortening ensues. If plates are used in exceptional cases, they should be long, and the screws inserted at a considerable distance from the fractured ends. He concludes :—

1. That only in very exceptional circumstances is it advisable to fix fragments of broken bones together by means of plates and screws while the wound is very foul.

2. That if, for certain reasons, such a procedure is deemed necessary, screws should not be inserted near the broken extremities, but as far from the seat of fracture as possible.

3. That it is advisable to postpone operative interference till the wounds have healed, when the tissues are, in all probability, free of organisms.

4. That if any apparently septic focus is observed during an operation, a culture and a vaccine should be obtained from it, and employed at once should symptoms of infection of the wound develop.

5. That should there be any definite suspicion of the presence of latent sepsis, effective drainage must be adopted at once. If not, the wound should be closed completely at the time of operation.

6. That every attempt should be made to avoid any shortening of the limb, or to reduce it to a minimum.

7. That the apposition of the whole areas of the broken ends is not necessary, since the interval will fill up subsequently if suitable means be adopted. Fragments of bone or callus should be saved and employed to fill any interval between the pieces of the shaft.

8. That much heavier steel plates are required in this class of case than are usually employed in the less comminuted fractures of civil life. The steel plates now supplied to the military hospitals are three times as resistant as those employed previous to the war. It is most important that the joints which are in relation with the fractured bone shall be moved as soon as possible after the operation, in order to avoid that stiffness and limitation of movement that so often complicate these fractures.

9. That the sooner the patient who has been operated on for fracture of one or more long bones of the leg is got up and about, the more bone will be deposited, and the more rapid will be the repair at the seat of fracture. For this purpose a good ambulatory splint is a necessity.

10. That should the interval between the fragments be so considerable that union is not likely to take place, even after prolonged congestion brought about by the use of an ambulatory splint, the fragments should be secured in perfect alinement by a plate fixed vertically behind the centre of the shaft. When this has been done, a portion of one of the fragments, which is usually equal in thickness to a third of the total circumference of the shaft, can be sawn off and secured over the interval between the fragments, any piece of bone removed to accommodate the graft in the other fragment being fitted to occupy such existing interval as may be left between the bones. If enough material cannot be obtained from the fractured bone to make a graft, it must be got from some other bone, but the former is usually the more convenient for the purpose.

11. That most of the failures of bone-grafting for extensive loss of substance are due to the surgeon depending on the unsatisfactory grip which the graft alone can be made to exert upon the fragments of the shaft. The essence of success depends on the absolute immobilization of the fragments of the shaft on one another, and of the graft upon those fragments.

Grossman[8] draws attention to fractures about the elbow-joint, and lays special stress on the importance of treatment in a fully flexed position. [Robert Jones has shown that in practically all fractures about the elbow-joint the muscles are relaxed and the fragments kept

in good position by full flexion of the joint. Fractures of the olecranon process, however, are the exception, and for obvious reasons should not be treated in flexion. Most surgeons prefer operation in these cases, but Grossman recommends a simple method in which a straight plaster-of-Paris splint is placed along the arm and forearm, with a pad in the elbow bend, so that the limb is not fully extended. The fractured fragments are kept in position by strips of adhesive plaster. The limb is kept in the extended position for three weeks: from time to time the splint is removed and passive movements are given. Grossman complains that in spite of early passive motion and massage there was considerable stiffness, eventually overcome by manipulative treatment. It is the experience of the writer, following the teaching of Robert Jones, that early passive movements in the case of fractured joints excites inflammatory action and the formation of excessive callus, and produces the very stiffness that the movements are supposed to overcome.—W. I. de C. W.]

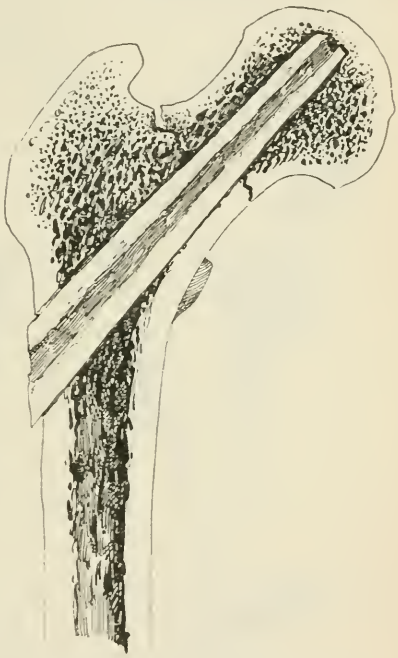


Fig. 42.—Section of a prepared specimen, illustrating repair by a fibular peg. (*Figs.* 42–44 *redrawn from* '*Annals of Surgery.*')

As the result of the powerful advocacy of Murphy, Albee, and others, the **Transplantation of Bone** in the form of autoplastic grafts has become one of the generalities of surgery. The graft should be covered with as much periosteum as possible, and should contain endosteum and marrow. It should, of course, be autogenous. If these conditions are observed, and asepsis and immobilization be secured, success is certain. We do not yet know upon what the life of a graft depends or where the new bone comes from. Murphy, Macewen, and others believe that there is little or no power in the periosteum to re-form bone. Other authorities think that osteogenesis lies in the young connective tissue surrounding the transplant, while Ochsner, Lexer, and Albee hold that bone-formation must be attributed in a large measure to the periosteum. The theory that the graft is simply osteoconductive from the contracting extremities of other living bone is also energetically put forward. McWilliams[9] deals fully with the literature of this subject.

Trout[10] discusses autogenous bone-graft versus Lane's plates. He points out that any foreign material limits osteogenesis in the region of fractures, and that autogenous grafts will often survive infection and in young subjects will not interfere with the growth of a bone. This is certain to occur when a Lane's plate is placed in the region of the epiphyseal line.

Robert Jones,[11] in discussing the rôle of the bone-graft, and referring to the theories already mentioned, points out that bone transplanted even into the abdominal wall will grow, with or without periosteum. Jones has employed the first metatarsal bone

Fig. 43.—Position of immobilization in autoplastic repair of fracture of the neck of the femur.

to replace a defect in the ulna; the periosteum is left behind and the metatarsal bone rapidly regenerates. In taking a graft from the tibia, if the electrically driven circular saw is not available, Jones recommends the drilling of a series of holes along the line of the incision in the periosteum, and then the connecting of these with the chisel. When a graft is required in a case of Pott's caries, he lays it alongside the spines of the vertebræ, and nurses the cases afterwards on a Thomas's frame. The frame is placed in position at the completion of the operation, while the patient lies face downwards, and with the aid of a sheet the patient and the splint are turned over

together. An interesting case is cited in this paper, in which a graft was accidentally fractured, the fractured ends uniting by the formation of callus.

Davison[12] describes treatment of the neck of the femur by bone-graft. He thinks it is the best treatment for both recent and ununited fractures, unless contra-indicated by age. He prefers a section of fibula as the most suitable graft. The following are the conclusions to an interesting paper: (1) Autoplastic transplantation of bone is the best treatment for both recent and ununited fractures of the neck of the femur, unless contra-indicated by age or condition. (2) The fibula furnishes the transplant of choice. (3) The transplant impinging on the points of compact bone as described will graft to these points of leverage and give strong support to the line of fracture. (4) The transplant imbedded in cancellous bone will stimulate the production of osteoblasts and the growth of new semi-compact bone in the cancellous area around the transplant, grafting them together by bony union. (5) The transplant must be completely immobilized until it has grafted to the recipient bone. (6) The position of immobilization must be extreme abduction and external rotation of the thigh. (7) The plaster case to be effective must extend from the axilla to the toes on the injured side, and also include the opposite thigh in abduction (*Figs.* 42, 43, 44.)

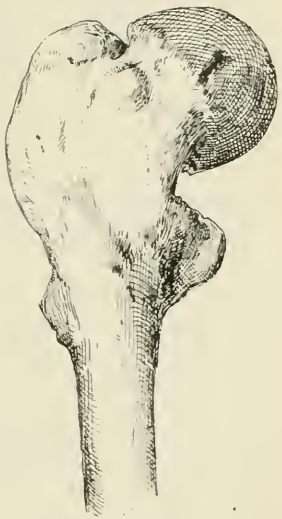


Fig. 44. — Drawing from post-mortem specimen of united fracture of the neck of femur.

To those who are not favourably disposed to immobilization with plaster-of-Paris to the extent recommended in this paper, Jones's abduction frame provides a simple substitute.

Albee[13] deals with the same subject. He deprecates the use of any form of metal fixation. Bone-grafting is believed to be indicated in all ununited fractures of the neck of the femur; in most unimpacted fresh fractures in operable subjects under fifty years of age; in all old fractures of the neck or at the epiphyseal cartilage where mal-union has resulted, with the neck depressed in a coxa vara relationship with the shaft. The bony deformity is corrected by either a cuneiform or linear osteotomy, and placing the limb in full physiological abduction (Whitman). After the operative correction of these two latter conditions by the usual cuneiform osteotomy, Hitzrot states that weight-bearing should be prohibited for at least a year. The employment of the bone-graft peg reduces this time by at least six months.

The patient should be placed upon a table which will allow,

simultaneously, abduction and traction (*Fig.* 45). The point of fracture is reached by an incision starting from a point a finger's breadth inside of the anterior superior spine and curved downward three to five inches along the inner border of the sartorius. The inner border of the muscle is exposed and retracted outward. The tendon of the rectus femoris is also exposed and retracted outward. The iliopsoas muscle is next exposed and retracted inward. The point of fracture is exposed, and all soft tissue is cleared from between the fractured ends, which are curetted and freshened.

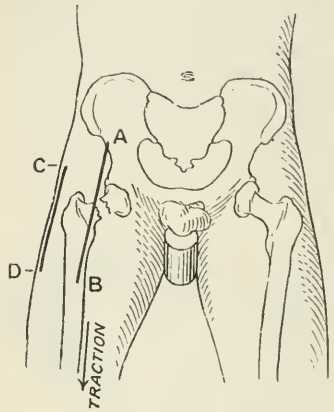


Fig. 45.—Patient on Hawley traction table. A–B and C–D are skin incisions. (*Figs.* 45–48 *redrawn from* '*Annals of Surgery*.')

The limb is now placed in abduction, and sufficient traction applied to bring the fragments into good apposition, as determined by both sight and palpation through the anterior wound. An incision 2 in. to 3 in. long is then made over and just below the great trochanter, which is exposed. With a small hand drill, the proper direction for the motor drill is determined by trial, as shown by observation through both wounds (*Fig.* 46). The drill-hole should be situated in the centre of the neck of both distal and proximal fragments, and parallel to the neck. The small hand drill may have to be reinserted in order to locate the proper track for the motor drill. The motor drill should be held ready by the operator for insertion into the track of the hand drill as it is withdrawn by the assistant. The motor drill, which forms a hole three-eighths of an inch in diameter, is pushed through the distal fragment until the burr end of the drill appears between the fragments, as seen through the anterior wound. Just as the end of the drill is engaging the broken end of the proximal surface, a reading on the graduated drill-shaft is taken at its entrance aperture in the great trochanter, so that by additional readings it can be determined just how deep the capital fragment is being penetrated (*Fig* 47). By studying the

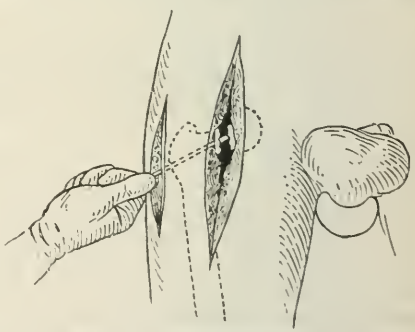


Fig. 46.—Drawing to illustrate author's method of determining with small hand drill the proper situation and direction for the motor drill. This hand drill is withdrawn as the motor drill is inserted.

skiagram, the length of this fragment can be very accurately determined, and hence the desired depth of the drill-hole obtained. When the fracture has occurred near the head, and the proximal fragment is consequently short, the drill-hole should extend close to the articular cartilage of the head. The drill is disengaged from the motor and left in place, to avoid any possible displacement of the fragments while the tibial graft is being procured. The crest of the lower portion of the tibia is laid bare, and an area of the desired size and shape is mapped out in the periosteum with a scalpel. The desired length of graft can be determined by the graduated scale on the motor drill. The cross-section of the graft should be just large enough to be shaped into the peg (*Fig.* 48) when the dowel-shaper is used. When the graft-peg is ready, the drill is withdrawn from the femur and the peg inserted (*Fig.* 49). The fit must be accurate, because the dowel-cutter is the counterpart of the drill used.

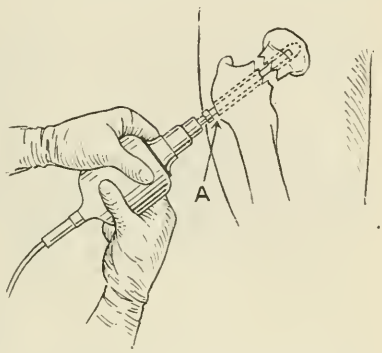


Fig. 47.—When the end of the burr has reached the space between the fragments and is ready to enter the capital fragment, a reading on the graduated shaft of the burr is taken at A; one is then able to tell just how far the burr should penetrate this fragment.

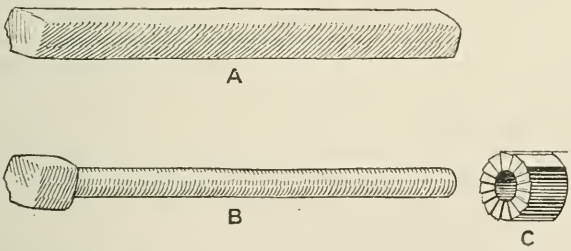


Fig. 48.—A is tibial graft. B is graft after being shaped into a peg, and is ready to be driven into burr-hole in neck of femur. C is the lathe-cutter.

The deep fasciæ are approximated with interrupted sutures of No. 2 chromic catgut; the skin wound is closed with continuous suture of No. 1 chromic catgut.

The limb is put up in abduction (Whitman's position) in a plaster-of-Paris spica extending from the toes to the axilla. Three weeks after the operation, windows are cut in the plaster, and the wounds dressed. The dressing should be replaced with cotton for the purpose

of restoring the tension of the plaster splint and retaining the fixation. The long spica should be continued for six weeks, and followed by a short one for six weeks longer.

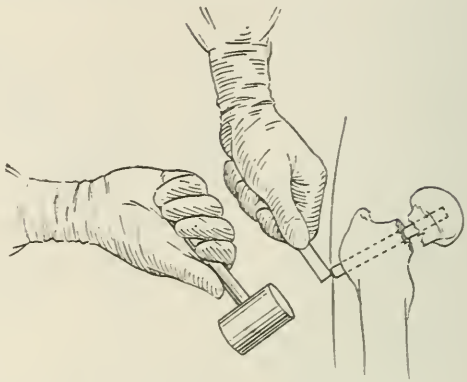


Fig. 49.—Graft peg being driven home.

REFERENCES.—[1]*Brit. Med Jour.* 1916, ii, 65; [2]*Ibid.* 254; [3]*Med. Rec.* 1916, ii, 52; [4]*Ann. Surg.* 1916, ii, 65; [5]*Brit. Jour. Surg.* 1916, Jan., 422; [6]*Ibid.* April. 592; [7]*Pract.* 1916, Mar., 231; [8]*Med. Rec.* 1916, Jan. 15; [9]*Surg. Gyn. and Obst.* 1916, i, 1 (abst.); [10]*Ann. Surg.* 1915, i, 717; [11]*Brit. Med. Jour.* 1916, ii, 1; [12]*Ann. Surg.* 1915, ii, 284; [13]*Ibid.* 85.

GALL-BLADDER, SURGERY OF.

E. Wyllys Andrews, M.D., F.A.C.S. (Chicago).

While few new points in technique have been brought out this year, much has been learned as to choice of operation. Many more cholecystectomies have been done, and as surgeons acquired skill in this operation, the mortality has decreased enormously. This applies especially to early cases, where it now runs only to 3 to 4 per cent.

In addition to this, several large series of cases from England and America have called our attention to the fact that drainage of an infected gall-bladder or one containing stones is not always curative. From 10 to 20 per cent are not cured, having a recurrence of pain due to infection or adhesions, or gall-stone colic appears once more. Most surgeons in these cases—3 to 5 per cent—blame themselves for having overlooked stones, but in view of Rosenow's experimental work showing how rapidly stones may be formed, it seems reasonable to suppose they recurred. In early gall-stone cases, then, excision is the operation of choice, also in chronic cholecystitis and hydrops.

In all acute infections, and in empyema and gangrene, the mortality from cholecystectomy has been enormous—25 to 35 per cent—and therefore more conservative measures are indicated. In acute cholecystitis it is best to wait. The mortality without operation is far less than with. After the acute symptoms subside, a cholecystectomy may be done. In empyema a cholecystectomy is indicated, followed

by excision later. In gangrene, simple incision and drainage is usually followed by complete extrusion of the sloughing organ, and this is much safer than the opening of lymph spaces and spreading of infection caused by cholecystectomy.

All authors are agreed in urging earlier operation on all gall-bladder diseases, for in early stages cholecystectomy can be done with only 2 to 4 per cent mortality, and in the more advanced stages even simple cholecystectomy gives 9 per cent mortality.

The value of **Radiography** is discussed on p. 42.

Adrenalin stated to relieve the pain of biliary colic (p. 12).

References.—*Amer. Surg.* 1915, i, 535; *Jour. Amer. Med. Assoc.* 1915, Oct., 142; *Clin. Jour.* 1915, Sept., 313; *Ther. Gaz.* 1916, Feb. 32; *Boston Med. and Surg. Jour.* 1915, ii, 451; *Med. Rec.* 1916, i, 774; *Ther. d. Gegenw* 1916, lvi, 446; *Surg. Gyn. and Obst.* 1915, Oct., 499; *Amer. Surg.* 1915, ii, 197.

GAS GANGRENE. (*See* Gunshot Wounds and Wound Infections.)

GAS POISONING. *Herbert French, M.D., F.R.C.P.*

A good deal of work is being done upon the question of 'gassing' by chlorine and other irritant or noxious fumes; but much that has been done under Government auspices has not yet been made known to the public. It is to be expected, therefore, that more knowledge of the subject will be available next year.

Some of the most elaborate experiments that have been published are due to Sir Edward Schäfer.[1] He used various animals, including cats, rabbits, and dogs, giving the chlorine in various strengths, and both by intravenous injection and by direct inhalation. The paper includes charts of the effects of the chlorine upon blood-pressure and respiration. The gist of the work was to show that the *immediate* ill effects of chlorine inhalations are due, not to spasm of the bronchioles, or to changes in their mucous membrane, but to obstruction in the pulmonary vessels rendering it impossible for the blood to pass freely to the left auricle and ventricle. This was the cause of the extreme gasping dyspnœa and the fatal ending. This discovery has a very important bearing upon treatment: for whereas atropine or other antispasmodics should be beneficial if spasm of the bronchioles were the main result of the poisoning, **Venesection** or **Hot Poultices** to the chest are more likely to do good when the trouble is stagnation in the lung vessels. This, in fact, has been found to be the case, whilst the immediate administration of an **Emetic** is also likely to benefit the patients in the same way that it does those suffering from poisoning by nitrous fumes in the Witwatersrand mines.

Watt and Irvine[2] refer to the latter. The poisonous gases that are inhaled in the mines are due to the explosion of blasting gelatin in confined spaces. Post mortem there is marked congestion and œdema of the lungs; the mucous membrane of the trachea and larger bronchi is injected; the abdominal veins are greatly dilated and engorged with dark tarry blood. They say that every man who has been exposed to nitrous fumes must be kept under observation in hospital if

possible for at least twenty-four hours. An emetic of **Copper Sulphate** 8 gr., followed by a large quantity of water, is given, or a hypodermic injection of **Apomorphine.** It is imperative that vomiting should be freely induced. If an emetic is given early, any other treatment, except rest in bed for a day, is not usually required. The onset of dyspnœa and cyanosis is watched, and should moist sounds develop at the bases of the lungs, blood-letting is employed, and as much as a pint may be withdrawn from a vein in the arm. This is usually difficult, as the blood is tarry and coagulates very rapidly. They have transfused with saline to replace some of the blood withdrawn. **Atropine** may be given hypodermically. Inhalation of **Oxygen** is also useful. Should symptoms of general œdema of the lungs develop, the prognosis is extremely grave. Very few recover when this stage has been reached.

To illustrate the efficacy of emetic treatment the following case is quoted : In a mine under the care of one of the authors a case of gelatin was accidentally set on fire. The fumes spread through the workings, and fourteen men were 'gassed.' Thirteen of them immediately had an emetic, and the next day were out of danger. One man disobeyed orders, and went home without receiving an emetic. He was sent for, but he had gone out for a stroll after having partaken of a hearty luncheon. He was found four hours after the accident, and came to hospital under protest, stating that he felt quite well. In the evening he developed general œdema and congestion of his lungs, and died before morning.

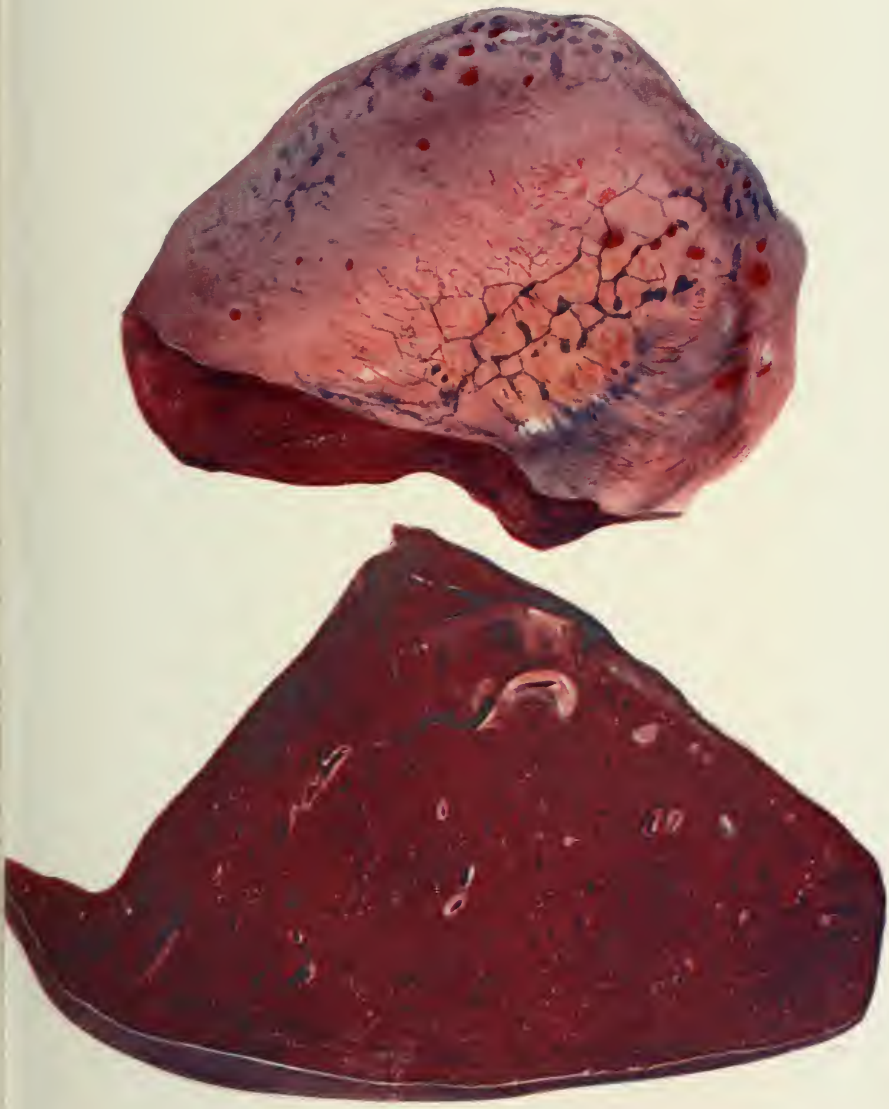
One effect of the stagnation of the blood in the lungs is a falling of the blood-pressure, owing to the fact that insufficient blood to maintain the systemic circulation passes through the lungs.

As regards the fatal dosage, Schäfer[1] found that a mixture of 1 part of chlorine gas to 20 of air, and all stronger mixtures, were invariably fatal in the animals he experimented on.

Although atropine, however administered, has been found to be disappointing in actual practice in acute and early cases, Cow[3] urges its use by hypodermic injection on account of the beneficial effects he has found from it in gassed rabbits. Symes,[4] on the other hand, considers that atropine given hypodermically does no good at all in these cases, but that it is beneficial when given by inhalation, especially in the form of **Stramonium Fumes.** He has found amyl nitrite useless whether given by inhalation or injection. **Adrenalin Chloride** intravenously (0·1 mgrm.) afforded slight and temporary relief in one of his cases, but in most it was useless. Lobelia, tobacco fumes, and opium inhalations proved unsuccessful. Inhalations of chloroform did harm in some cases, and no good in any. Stramonium fumes proved the least inefficacious of all the drug treatments he tried. On the whole, fresh air, emetics, hot poultices to the chest, venesection, the administration of oxygen, and the use of stramonium by inhalation seem to be the most useful therapeutic measures to adopt in the immediate treatment of gassing by chlorine fumes.

PLATE XXII.

CHLORINE GAS POISONING



Drawing of the lung of a patient who died four days after being gassed.

By kind permission of 'The British Journal of Surgery'

Broadbent[5] records cases of poisoning by chlorine gas in which acute nephritis developed as an early complication; some with albumin only, others with œdema, renal tube-casts, and even uræmic symptoms.

The persistent dyspnœa on exertion, with short shallow respiration, that is apt to persist in many patients who recover from the immediate effects of gassing, is a most troublesome after-effect which may entirely incapacitate an otherwise able-bodied man from further soldiering. The patient may be relatively easy when at rest, and may appear to be in perfect health; but on slight provocation he develops short gaspy breathing similar to that which ushers in an attack of asthma, and he has to desist from what he wishes to do. The cause is still obscure, though it may depend upon persistent changes in the mucosa of the bronchioles. The condition does not seem to be dangerous when it has reached this stage; but the incapacitation for exertion persists in spite of efforts to overcome it either by the will power of the patient or the therapeutic measures of the physician.

A helpful clinical and therapeutic report upon gassing with chlorine vapour, based upon 685 cases seen at the front, is due to Black, Glenny, McNee, and Herringham.[6] The cases which escaped death in the trenches and reached the casualty clearing stations were of two main types: (1) Those who seemed in imminent danger of death forthwith from asphyxiation; (2) The remainder, who, although suffering from the effect of the gas, did not appear to be in immediate danger.

Those who survived a severe gassing passed through three more or less definite stages on the way to recovery, viz., the asphyxial, the quiescent or intermediate, and the bronchitic stage.

"On arrival the patients were placed in the open air, and, as they were very cold, extra blankets, hot-water bottles, and hot drinks were provided. A little later on, as the weather was unsettled, and to facilitate nursing, the worst cases were placed in a large, lofty room with open windows on opposite sides, giving a through draught. Here about 120 out of the 685 cases were treated, the maximum number in the ward at one time being 30.

"**Emetics.**—As a routine measure, the first 80 cases admitted were treated with emetics. Later on, their use was confined to those cases which were obviously choked with secretion, and had not already been sick. The most successful emetic was salt and water, administered in 10-oz. doses, followed by large draughts of lukewarm water; vomiting was *immediately* induced by tickling the back of the throat with a soft brush, or by the patient using his own finger. In all cases marked relief was experienced, the patients bringing up quantities of yellowish frothy fluid. In fact, so pronounced was the relief, that many tried to make themselves sick again. **Vinum Ipecacuanhæ** and **Apomorphine Hydrochloride** were also tried, but were discarded, neither being so certain in their action as salt and water. There was no difficulty in getting the men to take the latter remedy, even in the most acute cases.

"**Artificial Respiration.**—The action of the emetics was furthered in selected cases by the application of Schäfer's method of artificial respiration. The results at times were strikingly successful, notably in the case of one man, almost moribund, who was treated in this way on four successive occasions, and who ultimately recovered.

"**Stimulating Expectorants.**—Every case was given ammonium carbonate 10 gr. every three hours, as a stimulant and expectorant. Later this dose was increased to 15 gr., and vinum ipecacuanhæ 15 min. added. This mixture, although containing a somewhat large dose of ammonium carbonate, frequently given, gave very good results, producing copious expectoration, followed by improvement in colour and general relief. In the 80 cases treated with emetics, the expectorant followed.

"**Posture.**—The action of emetics and expectorants was sometimes aided by altering the position of the patient, from sitting up to lying on the side, with the head low down to aid expectoration.

"In the hope of being able to check the excessive secretion in the lungs, **Atropine** was administered to several severe cases, in doses of $\frac{1}{50}$ gr. We cannot say we found any beneficial result from this treatment; doubtless its administration was too late, but it might have been of use if given earlier, that is, in the field ambulance.

"**Venesection.**—In view of the cyanosis and marked dyspnœa, venesection was attempted, 10 to 15 oz. being removed on each occasion. This proved very difficult to carry out satisfactorily, as the blood clotted rapidly, and the relief given was very transient. It occurred to us that a more gradual and protracted depletion of the right heart would give better results. Accordingly leeches were procured. Sufficient suitable cases did not then remain, however, to enable an opinion to be formed as to their value.

"**Pituitary Extract.**—Whenever the pulse showed signs of weakening—which was rare except in cases approaching a fatal termination—1 c.c. of pituitary extract was given, with marked benefit, the pulse becoming fuller and slower.

"**Oxygen.**—As most cases presented marked cyanosis and dyspnœa, oxygen was given freely by inhalation; there was no doubt that temporary benefit resulted, the restlessness decreasing and the colour improving. Continuous inhalations appeared to give no more benefit than intermittent ones. In one or two cases oxygen was given by subcutaneous injection in the pectoral region, the amount being sufficient to cause a lump in each side of the chest about the size of a small football. This was absorbed very slowly, and no relief was apparent.

"**Benzoin Inhalations.**—In milder cases, when the alveolar and bronchial secretion was not so marked as the irritation of the larynx and trachea, inhalations of steam impregnated with compound tincture of benzoin, in a closed tent, were tried, with some relief.

"**Opium.**—There was a type of case in which the mental strain was a more marked symptom than the pulmonary distress. This type was characterized by extreme restlessness rather than by dyspnœa,

and in these cases tincture of opium, 5 min. administered every half hour until 15 min. had been given, gave certain relief, the patients quieting down and falling into a peaceful sleep.

Other remedies, such as inhalation of **Chloroform** and **Amyl Nitrite**, were tried, but without success."

The routine treatment evolved from the experience gained was: (1) Abundant supply of air and warmth; (2) An emetic of salt and water if the patient was very cyanosed and had not already vomited, followed by (3) Administration of ammonium carbonate 15 gr. and vinum ipecacuanhæ 15 min. three-hourly; (4) Oxygen inhalation in cases of marked cyanosis and dyspnœa; (5) Opium 5 to 15 min. in restless cases to allay the mental strain; (6) Pituitary extract (1 c.c.) and brandy when the heart threatened to fail.

[1]*Brit. Med. Jour.* 1915, ii, 245; [2]*Ibid.* 247; [3]*Ibid.* 76; [4]*Ibid.* 12, 76; [5]*Ibid.* 247; [6]*Ibid.* 165.

Lewis A. Conner, M.D.

The very extensive use of poisonous gas during the past year has offered the opportunity of learning a great deal concerning its effects. L. Hill[1] points out the possibility of poisoning from the fumes of high explosives, and shows why the gas used is almost exclusively chlorine, at least as far as the trench gas is concerned. Asphyxiating shells have also been employed, and have been shown to contain organic compounds of bromine. The many writers on the subject practically agree on the different aspects of poisoning with chlorine gas.

Rose Bradford and T. R. Elliott[2] studied a number of cases, and divide the condition into three stages. The first or asphyxial stage occurs as a rule on the field. There is intense irritation of the exposed mucous membranes and the respiratory tract. Soon headache appears, and then lassitude so great that the men are apt to drop to the ground, where the gas is more concentrated and therefore the danger greater. Some died on the field, while most of them reached shelter behind the trenches, where the majority became unconscious. No autopsies were made on the bodies of patients dying during this stage. Nevertheless, Leonard Hill has carried on some experimental work which tends to show that chlorine causes a tremendous exudation of fluid in the lung, and the animal dies essentially from drowning. The lungs show congestion and œdema. This first stage lasts usually not more than thirty-six hours. Following this is a quiescent stage, when the symptoms are those of deep asphyxia in the most severe cases, while in the milder instances the patient may feel fairly well and perhaps sleep. Vomiting and cough stop. The colour may be violet-red and the respirations very shallow and rapid. The patient complains of pain in the throat, chest, and epigastrium. Many die during this stage, and Bradford and Elliott performed several autopsies upon the bodies. The findings were those of asphyxia: but, in addition, the lungs showed disruptive emphysema and generalized œdema. *Plate XXII* shows the lung of a patient who died four days after having been gassed. Disruptive emphysema was relatively slight in this

case, and there was no mediastinal emphysema. The upper drawing shows scattered subpleural hæmorrhages. The lobular reticulation marks the lines along which air-bubbles are found in the emphysematous cases. The lungs were voluminous and almost solid with œdema, so that they presented a uniformly fleshy appearance on section. From the trachea exuded a frothy serum, which was congealed to a yellowish white friable mass by the formalin preservative.

If the patient recovered, the signs of œdema gradually disappeared, and he was able to get about, though complaining of headache and lassitude. There next follows what has been described as the bronchitic stage, which is severe in only the most acute cases. Dyspnœa on exertion persists for a while but gradually disappears. The late development of bronchopneumonia has been noted in several instances, and this may determine a fatal outcome. Other lesions which may be found are asphyxial hæmorrhages in the stomach and a moderate acute parenchymatous nephritis, which is said to be due to the absorption of the poison into the circulation, through which it affects these organs. [This seems an improbable occurrence, for any chlorine absorbed into the circulation would be rapidly neutralized and thus lose its toxic properties; the effect is more probably due to the asphyxia.—L. C.] In a few cases there occurred vascular obstruction in the extremities, with progressive loss of the arterial pulse. This was not of an embolic nature, and frost-bite was excluded. Gangrene threatened, but normal circulation was ultimately restored.

Treatment.—This depends upon the stage and on the severity of the case. In the most acute cases it is necessary first to get rid of the excessive secretion which is drowning the patient. Hill,[1] and Black, Glenny, and McNee[3] recommend **Artificial Respiration,** an **Inverted Posture,** and the use of **Emetics.** **Oxygen** may relieve the cyanosis and improve the condition of the patients, but is difficult to give effectively or economically. Hill found that compressed air had as good effect on his animals as the oxygen, and suggests the possibility of using a small medical air-lock for these patients. Injections of atropine apparently were of but little value. Supportive measures are indicated, and **Pituitary Extract** was given at times with very good results. Plenty of fresh air, blankets, and warmth should be of aid in avoiding the development of lobar or bronchopneumonia.

Hebblethwaite[4] recommends **Venesection** in what he calls the cyanotic type, where the patient is deeply cyanosed and very dyspnœic but with a strong pulse. The removal of fifteen to twenty ounces of blood relieved the cardiac embarrassment and permitted the patient to sleep. He is of the opinion that those who were bled did better than those who were not. Patients who were pallid and collapsed did not require venesection.

All authors agree that the use of a proper respirator will prevent poisoning from the gas, and apparently the number of cases has been

greatly reduced since the troops have been provided with such apparatus.

References.—[1]*Brit. Med. Jour.* 1915, ii, 801 ; [2]*Brit. Jour. Surg.* 1915, Oct., 234 ; [3]*Canad. Pract. and Rev.* 1916, xli, 15, also abst. *Surg. Gyn. and Obst.* 1916, xxii, 627 ; [4]*Brit. Med. Jour.* 1916, i, 107.

GASTRIC AND DUODENAL ULCER.

Robert Hutchison, M.D., F.R.C.P.

Graham[1] and Eusterman,[2] from experience obtained at the Mayo clinic, are both convinced that clinical differentiation between gastric and duodenal ulcer is always difficult and often impossible. Nor is it easy to be sure from the symptoms as to the exact position of a gastric ulcer. These general observations, however, can be made: The longer the period between food intake and pain, the lower the ulcer as a rule ; the more prompt the onset and the briefer the duration of the pain, the higher the ulcer. In ulcers well above the pylorus, on the other hand, the symptoms are likely to be continuous, or remissions rather than intervals of complete relief are likely to be noted. The pain is not so often relieved by food ; small amounts may bring relief, whilst large meals cause distress ; more care as to diet is necessary ; if bleeding occurs, hæmatemesis predominates ; vomiting is more prominent even in the absence of obstruction, and gives relief ; alkalies relieve pain when food does not ; pain begins earlier as a rule, often disappearing before the next meal. They both agree that the diagnosis of a gastric lesion being made, the question of its exact location is not of great importance.

References.—[1]*Boston Med. and Surg. Jour.* 1915, ii, 543 ; [2]*Jour. Amer. Med. Assoc.* 1915, ii, 1500.

GASTRIC SURGERY. (*See* Stomach, Surgery of.)

GAUCHER'S DISEASE. *Frederick Langmead, M.D., F.R.C.P.*

J. H. M. Knox, H. R. Wahl, and Schmeisser record two examples of this rare disease in infants who died, one at eleven months and the other at fifteen months of age. The chief clinical features were great enlargement of the liver and spleen, and a peculiar yellowish-brown hue of the skin, especially on the face and exposed surfaces. The blood-pictures showed a moderate anæmia, generally accompanied by considerable leucopenia. The diagnosis was established during life in one case by the examination of an excised lymphatic gland. In nearly all the organs were found the distinctive cells described by Gaucher. These were large, pale, granular, or finely vacuolated, and contained a refractive substance having the chemical and staining properties of a lipoid. Collections of the cells constituted the characteristic lesions, and were found widely diffused throughout the body, being most prominent in the lymphadenoid tissues. The process was equally marked in the lymphatic glands and in the spleen, and probably occurred simultaneously in these areas.

Reference.—[1]*Johns Hop. Hosp. Bull.* 1916, xxvii, 1.

GENERAL PARALYSIS.

Bedford Pierce, M.D., F.R.C.P.
Marguerite Wilson, M.B., Ch.B.

Diagnosis.—The Wassermann reaction is found to be positive in the majority of cases of general paralysis, both in the blood and in the cerebrospinal fluid. Thus, out of 168 cases,[1] it was positive in 87·5 per cent in blood and 87·2 per cent in the spinal fluid. But in doubtful cases the Wassermann reaction is frequently of little assistance, as the results vary greatly. Weston and Darling[2] report six cases in which no positive reaction was obtained in the blood during two years. In the cerebrospinal fluid, variations are also found; sometimes a negative reaction slowly changes to positive. The extreme complexity of this reaction, and the varying methods adopted by pathologists, make it difficult to draw satisfactory conclusions from published results.

There are also considerable variations in the cellular content of the fluid. Weston and Darling made repeated cell-counts every fortnight, and found wide variations from 0 to over 100, and these variations appeared to bear no relation to the clinical symptoms. They state, however, that the colloidal gold test is exquisitely delicate. Darling and Newcombe[3] also find that the globulin test and the cell-counts in the cerebrospinal fluid give inconstant results. They believe that a positive Wassermann reaction will eventually be found if the blood is repeatedly examined. They do not, however, consider the laboratory findings by themselves conclusive, but state that a satisfactory diagnosis can only be made when the clinical symptoms and the pathological findings are taken together.

Treatment.—It is generally recognized that neither **Mercury** nor **Salvarsan** administered intravenously affects the course of general paralysis. Ehrlich himself suggested that the molecule of salvarsan was too large to pass from the capillaries and did not reach the nervous elements. Now that the presence of living spirochætes amongst the nerve-cells has been demonstrated, the difficulty of destroying the former without the latter is seen to be serious. The problem has been attacked in America and on the Continent by the introduction of salvarsan and other drugs into the spinal canal, or the subdural space, or even into the ventricles of the brain. The results so far obtained are deeply interesting.

Henry A. Cotton[1] considers the treatment of general paralysis in its early stages by **Salvarsanized Serum** of real utility. The following methods are used:—

1. Swift-Ellis method. An intravenous dose of salvarsan or neosalvarsan is given, and an hour later blood is withdrawn, from which, after standing, the serum is removed. This is diluted with normal salt solution. The usual dose was 15 c.c. of serum and an equal amount of salt solution. On the following day lumbar puncture is performed, as much cerebrospinal fluid withdrawn as can easily be borne, and the salvarsanized serum introduced. This may be repeated in ten days, but there are obvious objections to the repeated administration of salvarsan intravenously.

2. Ogilvie modification, in which the serum from 50 c.c. of blood is treated outside the body with $\frac{1}{4}$ mgrm. of salvarsan. After incubation and heating, the serum is ready for use. The dose is usually 10 c.c. administered as in the previous method. Salvarsan is also injected intravenously every ten days or so. The advantages claimed are that the dose is known, and it can be given much more frequently than by the former method.

3. Cerebral puncture in association with lumbar puncture (Wardner). The salvarsanized serum is obtained as in the first method, and introduced under the dura through a trephine opening, the pressure of the fluid having been reduced by means of lumbar puncture. The dose is 30 c.c., and the site is over the precentral gyrus, first one side and then the other being operated upon. It is claimed that fewer treatments are necessary when the drug is introduced beneath the dura.

4. Bichloride of mercury serum (Byrnes) is also used, and is prepared similarly to the Ogilvie method with $\frac{1}{50}$ mgrm. of HgCl to the serum from 6 oz. of blood. It is thought that this may take the place of the costly salvarsan.

5. Cotton methods, by which either salvarsanized or bichloride serum is introduced both under the dura and by puncture into the ventricles, at the same time lumbar puncture being performed to reduce the pressure of the cerebrospinal fluid. It may be noted that in two cases both the globulin content and the cell-count were found to be higher in spinal fluid than in that from the cerebral ventricles.

Out of 31 cases treated for more than six months, 11 were stated to be arrested, 7 much improved, 7 not improved, and 6 died. The full details are recorded, and charts given showing the variation of the cell-count and the globulin reaction, with diagrams illustrating the varying physical and mental conditions of the patients whilst under treatment. Some photographs showing the improvement in the writing are also published. The cases were of various types—some expansive, some neurasthenic, others tabetic. Neither mercury nor iodide was used to supplement treatment. On the whole, preference was given to neosalvarsan as against salvarsan. The following are some of the conclusions that were arrived at: Salvarsanized serum undoubtedly arrests the course of general paralysis when it is given in the early stages, but it is useless in advanced cases. Treatment should be persistent and uninterrupted. The Swift-Ellis method is perhaps the most efficacious, and if this fails, other methods are not likely to succeed; but in order to continue treatment it is desirable to alternate this with the Ogilvie method. It is claimed that the remissions which have occurred are accompanied by changes in the cell-count and in the globulin reaction in the spinal fluid far more frequently than the corresponding changes during the remissions in untreated cases.

Evans and Thorne[5] report on fifteen cases treated with salvarsan and neosalvarsan, with unsatisfactory results on the whole, only three cases showing mental and physical improvement. It is claimed that

the intrathecal injection really reaches the convexity of the brain, and that intracranial injection is unnecessary. They say the difficulty is to give enough without causing serious irritation.

Wardner[6] reports the treatment of 14 cases, each with from three to ten doses of salvarsanized serum introduced subdurally. The serum was administered on alternate sides at two-week intervals. Of these, 5 went home and back to work, one of whom relapsed and improved again; 3 improved sufficiently to have parole, 2 others partially improved, 2 did not improve, and 2 died. There was no reason to think the operation dangerous. Whilst admitting it is too soon to draw conclusions, he considers his results encouraging, and the opinion is expressed that if general paralysis could be recognized early, the disease might be arrested.

The injection of diarsenolized serum into the cerebral ventricles is reported by Knapp[7] to have resulted in marvellous improvement in two cases. A trephine opening half an inch in diameter is made in front of the bregma and an inch to the right of the median line. The dura is incised, and a blunt-pointed cannula inserted downwards and backwards about 6 or 7 cm. into the lateral ventricle. About 10 to 20 c.c. of cerebrospinal fluid is allowed to drain off, and an equal quantity of the arsenolized serum is introduced slowly. This contains from 0·6 to 0·8 mgrms. of diarsenol or, if preferred, salvarsan or neosalvarsan. The wound is then closed. Subsequent injections are given through the scalp. The cases were not sufficiently long under observation to enable a trustworthy opinion to be formed as to ultimate results. The first case, after two injections at nineteen-days interval, was discharged and did some work. The Wassermann reaction changed from positive to negative, and the sluggish pupils reacted promptly. In the second case the results were similar: the light reflex in the pupil returned, and the Wassermann test became negative.

In considering these results it must not be forgotten that in general paralysis remarkable remissions occur without special treatment, and sometimes the pupillary and physical symptoms clear up and the patient is able for a time to return to work. It must be conceded, however, that in some of the cases recorded the improvement was very rapid and followed immediately the treatment adopted. The fact remains that as yet we are unable to say whether salvarsan is of value in preventing the development of general paralysis or in the treatment of the declared disease.

References.—[1]*Amer. Jour. Insan.* 1916, Jan.; [2]*Ibid.* 1915, Oct., 325; [3]*Ibid.* 1916, Jan., 449; [4]*Ibid.* 1915, July and Oct.; 1916, Jan.; [5]*Ibid.* 1916, April, 623; [6]*Ibid.* 643; [7]*Boston Med. and Surg. Jour.* 1916, ii, 24.

GENITAL PROLAPSE. *W. E. Fothergill, M.D.*

Numerous papers on the operative treatment of genital prolapse have appeared during the year. Most of these advocate the use of operations which are neither necessary nor successful. The writers do not appear to be aware that the classical treatment for the varieties

ANTERIOR COLPORRHAPHY COMBINED WITH AMPUTATION OF THE CERVIX

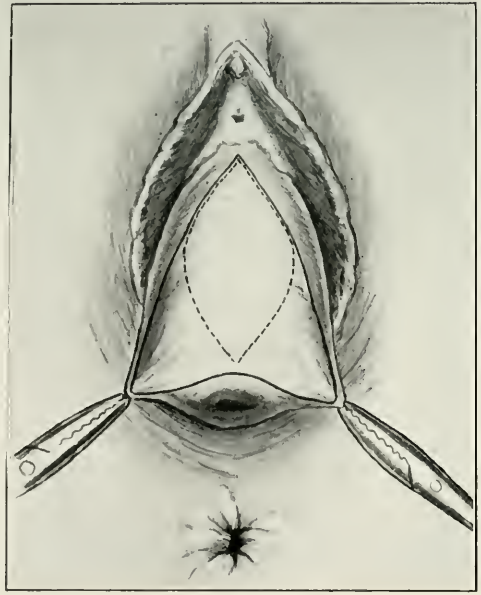


Fig. A.—Without amputation of the cervix. The dotted line shows the usual incision. The plain line shows the author's incision, extending upwards and backwards on either side of the cervix.

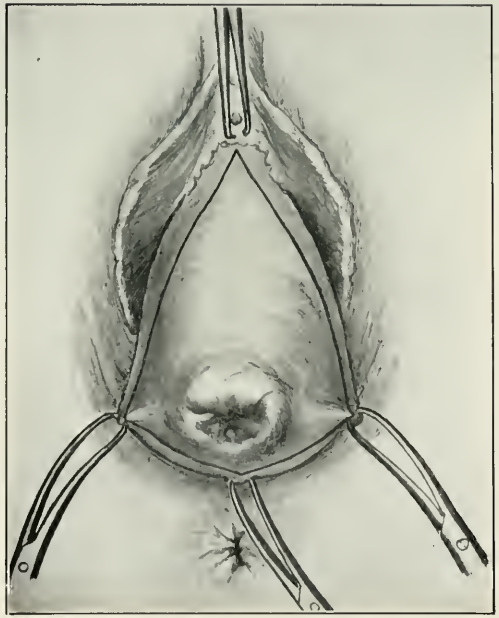


Fig. B.—Combined with amputation of the cervix. The line of incison.

From 'The American Journal of Surgery.'

PLATE XXIV.

ANTERIOR COLPORRHAPHY COMBINED WITH AMPUTATION OF THE CERVIX—*continued*

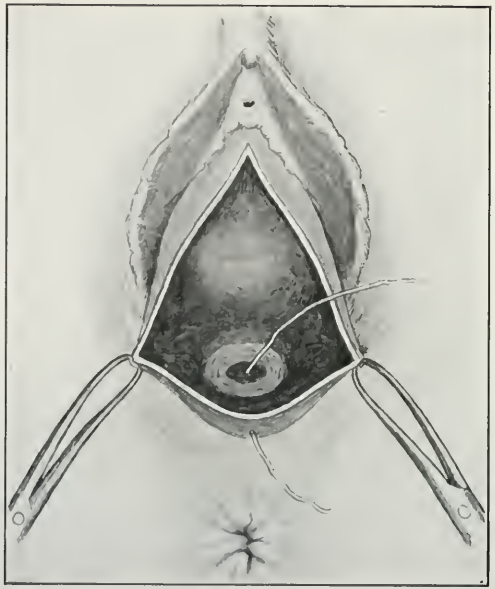


Fig. C. The triangle of vaginal wall has been removed with the cervix in one piece. The suture has been inserted from the cervical canal through uterine wall and vaginal wall.

Fig. D.—The first three sutures have been inserted and tied. They are left long and serve as tractors until the suturing of the cervical stump is complete. The fourth suture has been inserted through the vaginal wall and uterine wall into the cervical canal.

From 'The American Journal of Surgery.'

PLATE XXV.

ANTERIOR COLPORRHAPHY COMBINED WITH AMPUTATION OF THE CERVIX—*continued*

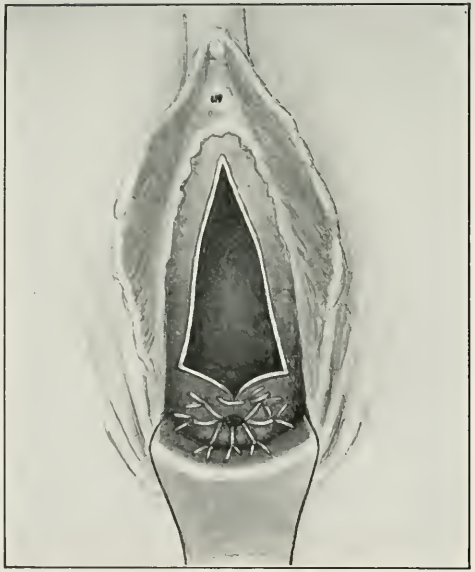


Fig. E.—The suturing of the stump of the cervix is complete. The first suture uniting the sides of the wound has been inserted and tied.

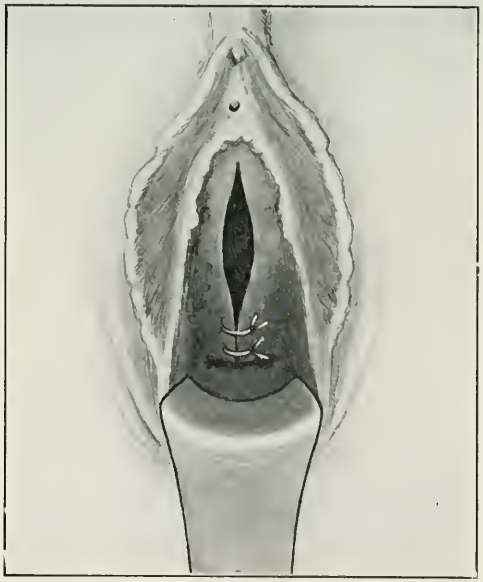


Fig. F.—More sutures have been inserted, tied, and cut. The stump of the cervix has passed upwards and backwards into the hollow of the sacrum and is no longer visible. The uterus is now anteverted.

From 'The American Journal of Surgery.'

of genital prolapse consists in anterior colporrhaphy, amputation of the cervix, posterior colporrhaphy, and perineorrhaphy, combined according to the requirements of each case. No abdominal operation, no 'freak' vaginal operation, and no combination of the two has given results so good as those constantly secured by the exponents of the classical method. Patients constantly appear complaining of cystocele, rectocele, protrusion of the cervix at the vulva, and combinations of these lesions, after they have submitted to operations such as interposition, hysterectomy, and ventrifixation —operations which involve some risk to life in addition to their failure to cure. For the relief of a condition which never kills the patient, it is not proper to do any operation which is not surgically 'safe.' Those who would cure genital prolapse should make themselves familiar with the classical and gradually perfected methods which do no harm and which, if employed with judgement and skill, are perhaps the most uniformly successful of surgical operations. Until he has done this, no one has any excuse for theorizing, speculating, and experimenting on patients. By observation in the out-patients' department of any hospital for women, the student notes that cases of genital prolapse fall naturally into four main groups. They may be classified in many other ways, for the essential lesions occur in various combinations ; but four is the smallest number of 'varieties' of prolapse which will serve for practical purposes. The writer[1] has summarized the principal features of these varieties, and the treatment appropriate to each, as follows :—

1. *True Prolapsus.*—The uterus, vagina, and bladder are all loose. The anterior vaginal wall appears first at the vulva, and is everted from below upwards (cystocele) ; the cervix follows it, and, in advanced cases, the posterior vaginal wall follows the cervix and so completes the '*procidentia.*' Common in parous women, seldom or never seen in virgins and nulliparæ.

Treatment.—Excise most of the anterior vaginal wall with the front half of the vaginal roof. Remove the cervix also if it is unhealthy or if the uterus is more than 3 in. long. The writer's method of combining anterior colporrhaphy with amputation of the cervix is useful ; *Plates XXIII, XXIV* and *XXV* illustrate this method. Repair the perineum.

2. *Long Cervix.*—The uterus is long and loose. The cervix appears first at the vulva, and the vaginal roof is inverted from above downwards round the elongated cervix. There is no cystocele. This is the form of prolapse seen in virgins and nulliparæ as well as in parous women.

Treatment.—Excise the front half of the vaginal roof together with the cervix, leaving the uterus 3 in. long. Repair the perineum.

3. *Cystocele.*—The anterior vaginal wall is everted from below upwards as in true prolapsus, but the uterus retains its normal position. Seen in parous women with defective perineum, but not in virgins and nulliparæ.

Treatment.—Anterior colporrhaphy and perineal repair.

4. *Rectocele.*—The posterior vaginal wall is everted from below upwards, with the anterior rectal wall adherent to it. Seen in parous women with torn perineum, but not in virgins or nulliparæ.

Treatment.—Remove most of the posterior vaginal wall and repair the perineum. The best method is Professor A. Donald's colpo-perineorrhaphy, which is done from above downwards, so as to combine the two operations.

It is hardly necessary to say that the four forms of prolapse occur in various combinations. Thus rectocele may be seen alone, with cystocele, with true prolapsus, or with long cervix and vaginal inversion.

Reference.—[1]*Lancet*, 1916, i, 1121.

GINGIVITIS, ACUTE INFECTIVE. (*See* Stomatitis, Ulcerative.)

GOITRE, EXOPHTHALMIC. *Herbert French, M.D., F.R.C.P.*

Aikins[1] speaks favourably of **Radium** applied locally over the thyroid gland. He gives details of seven cases so treated, but it is very difficult to deduce just how good the results were. As published, they appear to have been cures. In my own experience cure is not obtained by radium treatment, but decided alleviation of the symptoms is; besides which, if operative measures are to be adopted, a preceding treatment by radium seems to make the operation itself safer and the result better. Treatment by *x*-rays has the disadvantage that the applications have to be made two or even three times a week over a period measured in months; radium treatment has the great advantage of being periodic—one to five days at a time, with an interval of six weeks or two months before a second series is required.

It is difficult to say whether the radium results are as good as those with the *x*-rays, because enough cases are not yet recorded; but if they are anything like as satisfactory as they promise to be the fact that the radium applications give the patient much longer intervals of freedom forms a strong argument in their favour. (*See also* p. 49, 53.)

Reference.—[1]*N. Y. Med. Jour.* 1916, July, 49.

W. I. de C. Wheeler, F.R.C.S.I.

Surgical versus medical treatment of exophthalmic goitre still attracts the attention of hospital surgeons and physicians. The outstanding features of this controversy are summarized in the Medical Annual for 1916. E. S. Judd and J. D. Pemberton, of Rochester,[1] return to the subject. Only the patients operated on in 1909, and in whom a definite diagnosis had been made, were selected for this study. Of 176 cases, 121 were traced by correspondence and subsequent examination. Ligation of the superior thyroid vessels was the custom in two types of cases. In one type the disease was mild, and a cure

was hoped for by the simple procedure : in the other type the disease was severe, and one or more ligations were done as a preliminary to resection. In most cases the thyroid was resected. Judd and Pemberton divide their cases into five groups. In Group 1 the patients were cured ; they numbered 55. The surgical procedures varied, as mentioned above. In Group 2 the patients were practically cured of their symptoms, but at times had slight evidence of the disease. In this group were 22 patients. Group 3 includes 7 patients who reported that they were markedly improved, but most of the time there was some evidence of the old trouble, and a little exophthalmos or nervousness was retained. Most of them had entirely regained their normal weight and physical strength. Group 4 comprises 5 patients in whom there was slight improvement ; and Group 5, 8 patients who derived little or no benefit from the operation. Judging from the results in this series of 121 patients, a cure may be expected in about 45 per cent, 23 per cent will be practically cured, 4 per cent will obtain some benefit, and 5 per cent no benefit at all.

REFERENCE.—[1]*Med. Press and Circ.* 1916, ii, 125.

GONORRHŒA. *C. F. Marshall, M.D.*

Major E. G. Ffrench[1] describes the treatment now carried out at the Military Hospital, Rochester Row. Irrigation of urethra and bladder with 1–8000 **Permanganate of Potassium** from a height of seven feet is performed for the first two days by a trained orderly. Afterwards the patient irrigates himself morning and afternoon in the standing position, each patient being given a sterilized Wyndham-Powell metal nozzle.

During the first two weeks an alkaline mixture is prescribed along with milk diet. At the end of the first week the pressure is raised to eight or nine feet and the strength of solution increased to 1–4000. During the third week **Hexamine** and **Acid Phosphate of Sodium**, 10 gr. of each, are given if required.

The discharge ceases on the average in fifteen days. Patients are kept for another ten days for observation and treatment. Five days after cessation of the discharge, a dose of 25 million stock **Vaccine** is given.

On the sixth day a curved metal bougie, Nos. 12 to 14, is passed to break down all infiltration and prevent stricture. Five days after the first dose of vaccine a dose of 50 million is given. If the smear is then free from gonococci and pus cells the patient is discharged, making the average stay in hospital twenty-six days. In cases of epididymitis, Puncture of the epididymis and **Hot Fomentations** often give relief, followed by **Glycerin** and **Belladonna.**

Chronic cases are urethroscoped both anteriorly and posteriorly. If inflammation of Littré's glands is the cause, the glands are massaged over a straight bougie. Small ulcers are touched with 2 per cent **Nitrate of Silver** ; similarly, papilloma of the verumontanum. If the prostate is enlarged and nodular, it is **Massaged** two or three times a

week. In cases of chronic catarrh of the posterior urethra, three or four drops of a 2 per cent solution of silver nitrate are instilled by Guyon's catheter. In chronic cases, especially when gonococci are found, **Vaccines** are given in doses up to 1000 million. In obstinate cases an autogenous vaccine is used. In cases which do not respond quickly to the permanganate solution this is changed for 1–10,000 silver nitrate, increased to 1–5000 in a week. Protargol, albargin, and other silver salts were used with varying success, but irrigations are not to be relied upon in obstinate cases.

Ten cases of acute anterior and posterior gonorrhœa were treated by Russ's electrolytic method (*see* MEDICAL ANNUAL, 1916, p. 291) with doubtful results, for although the discharge ceased in eight to fifteen days, gonococci were still present in the smears.

Cambell's[2] method of applying **Suction to the Urethra** was tried in some cases with good results. The apparatus consists of a close-set spiral wire the size of a No. 12 English bougie. This is passed down the urethra, after an injection of oil, and the canal is closed and made air-tight by means of a cone passed over the bougie and pressed into the meatus. It is connected by a rubber tube to a vacuum pump, and the amount of suction is regulated by a manometer. This action empties the glands of the urethra and causes hyperæmia.

Gonorrhœal rheumatism is treated by strict attention to the urethra, **Vaccine** injections, and a mixture containing the following :—

℞	Sodium Salicylate	gr. viij	Citrate of Iron and		
	Potassium Iodide	gr. viij	Ammonium	gr. v	

Whenever possible an autogenous vaccine was used. In some cases intensive **Iodine** treatment was given—15 to 30 gr. of potassium iodide after breakfast, followed by 1 oz. of chlorine water later in the day, at intervals of four, six, and eight hours. This liberates free iodine in the tissues. Locally, the joints are treated with **Hot Fomentations** of glycerin and belladonna, and afterwards **Massage.** Good results were obtained with vibromassage.

Wyeth[3] remarks that, since nature's method of attacking the gonococcus is by phagocytosis, the indication is to employ a remedy which, first, stimulates leucocytosis ; secondly, acts as a mild gonococcicide ; thirdly, cleanses the urethra without injury to the tissues. Thus, in the early stages of gonorrhœa the aim is to increase the discharge, not to check it. These indications are, he thinks, best carried out by **Protargol** in 0·25 to 0·5 per cent solution. Protargol, he says, produces a purulent discharge when injected into a normal urethra, but a 2 per cent solution is astringent, and this strength is therefore to be avoided. Wyeth is of opinion that many cases of acute gonorrhœa, if seen within twenty-four hours after discharge has commenced, can be cured in five or six days by combined irrigation and injection with 0·25 per cent protargol, except in cases of primary infection. In the latter the infection makes more rapid progress than in second infections, because the cylindrical epithelium of the virgin urethra, after

invasion by the gonococci, is regenerated as pavement epithelium, which is more resistant.

Miller and Luck describe the treatment of gonorrhœal arthritis by the injection of **Foreign Protein** (p. 24).

REFERENCES.—[1]*Pract.* 1916, May, 457 ; [2]*Brit. Med. Jour.* 1916, i, 817 [3]*N. Y. Med. Jour.* 1916, Feb., 244.

GOUT. *Herbert French, M.D., F.R.C.P.*

Histological examination of the ends of bones adjacent to gouty joints has led Berkart[1] to the discovery of certain cystic changes in the diaphyses of the bones, and to an explanation of the acute phenomena of an 'attack' of gout which sounds more probable than any of the hypotheses in which uric-acid deposit is presupposed. He considers that these minute cysts in the bone itself gradually enlarge, and because of the concomitant thinning of the surface bone there comes a time when the cyst bursts into the joint, discharging its contents into the latter. Such an occurrence may well be the cause of the acute 'attack' ; at any rate, no adequate explanation of the acuteness of gouty attacks has been supplied hitherto, and Berkart's view merits considerable attention, for it is based upon histological studies of the parts affected, and not upon merely naked-eye examinations. As he himself says, the difficulty has been to obtain the parts for examination. In many cases of acute gout the articular cartilage has been found apparently quite normal and free from urates ; and yet the 'attack' of gout has been severe enough. The fact is that there is a pathological process of frequent occurrence which gives rise to clinical phenomena closely similar to those commonly called a gouty paroxysm, but which is not due to uric acid. The habit of looking to the surface of the joint for the cause of the painful swelling has diverted attention from its other constituents. Yet, if the corresponding bone be carefully examined, it will be found that very often there take place within it, silently and almost imperceptibly, changes which in their last stages fully account for those symptoms. Such examination discloses in the first metatarsals, and occasionally also in the phalanges, a cystoid degeneration which starts in the epiphysis, extends to the articular cartilage, and after perforating it allows the

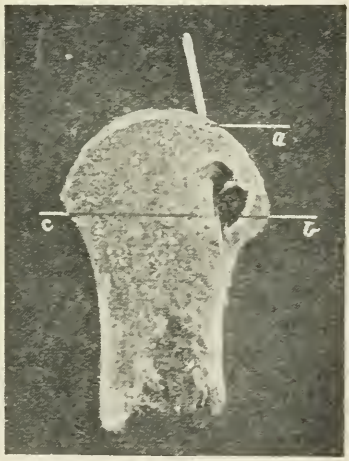


Fig. 50.—Section through the epiphysis and adjoining part of the diaphysis of a first metatarsal bone. *a*, Fistulous opening through which a glass rod has been passed into a cyst, *b*, which has formed in the area of fibrous tissue, *c*.

discharge of the cystic contents into the joint, thus producing an acute 'perforative synovitis.' The resulting fistulous openings are generally minute and readily escape detection, as do the cysts themselves so long as they are of small size and concealed by the fat-marrow: but when the bone is fully prepared for microscopic examination they are easily recognized, and are found to be either isolated in their earlier stages or multiple, and gradually coalesce so as to form a macroscopic excavation (*Fig.* 50).

Of the contents of these cysts little is definitely known, as they rarely come under anatomical observation, except in accidents or surgical operations. They appear to consist, when of comparatively recent origin, of a coagulable substance which later on softens and becomes serous or hæmorrhagic. So long as the canal thus formed remains pervious, or when its calibre becomes enlarged, the necrotic matter periodically passes into the joint and gives rise to periodic attacks of synovitis; only in the cases which are not here under consideration, where the cysts are situated near or within the diaphysis without reaching to and perforating the cartilage, it accumulates within the bone, which then is gradually expanded by its pressure.

From the histological details of the affected epiphyses it may with safety be inferred that this cystoid degeneration originates from an anomaly of the vascular and osseous systems. Conspicuous amongst them is the abundance of dilated and thin-walled veins, which are here and there studded with emigrated blood-corpuseles. There is consequently evidence of a state of chronic congestion, under the influence of which the trabeculæ are decalcified, and the adjoining fat-marrow becomes fibrous. From these sources are formed patches of fibrous tissue, which, owing to the thrombosis of the neighbouring vessels, soften and are converted into cysts. To this abnormal vascularity also must be attributed the pain which some individuals feel in the smaller bones of the hands or feet after the consumption of even one glass of a generous wine. This pain is commonly regarded as a sign of gout, and attributed to uric acid, whereas in reality it proceeds from an undue relaxation and consequent over-distention of the vessels, which are deprived of their normal support by the osseous trabeculæ.

When once this process has reached the articular cartilage and has perforated it at several spots, the surface of the bone is apt to be worn off and laid bare, in consequence of which it becomes inflamed and rarefied. The first phalanx may then be deflected outwards. A frequent complication of this condition is a lymphangitis, and the whole leg may thus become the seat of a leucophlegmatic œdema.

GUNSHOT INJURIES OF NERVES. (*See* NERVES, INJURIES OF.)

GUNSHOT WOUNDS OF THE HEAD. (*See* BRAIN AND SKULL.)

GUNSHOT WOUNDS AND WOUND INFECTIONS.

Deputy Surg.-Gen. A. Gascoigne Wildey, R.N.

In the early months of the present war the lamentable failure to obtain satisfactory results from the measures then employed in the treatment of severe gunshot wounds was received with astonishment and some dismay. We had blundered. But how? What had we done or left undone? Surely the South African War had proved that ordinary methods were efficient in the field, and that the claims of military surgery to be a subject needing special study and special experience were the delusions of old-time military surgeons! Soon we were charged with having forsaken our gods, and at the same time it was proclaimed that our gods had forsaken us. A puzzled profession seemed about to form two hostile factions, one rallying under the banner of "Back to Lister," the other crying, "Abandon bactericides: back to Nature and physiological methods." Both sides based their suggestions for the treatment of infected wounds upon ingenious laboratory experiments. But with a true if tardy appreciation of the extraordinary environment of the wounded, of the real nature of their wounds, and the causes of infection, came the realization that military surgery is a special and a progressive subject, and that its practice cannot be intelligently anticipated in the library arm-chair, nor yet in the laboratory. Clinical results, although they may run contrary to well-reasoned *a priori* deductions are the only sure foundations for sound treatment. The onlookers may divide into 'schools of thought,' but few of the actual workers within the wide area of the war will be biassed by extreme views, nor will they accept teachings founded on laboratory experiments alone. They will be quick, however, to recognize practical results, and ready to adopt practical suggestions wherever found.

Before attempting to review recent progress in the treatment of gunshot wounds, it is necessary to consider the causes leading to the early over-confidence in what one may call 'ordinary methods.'

Causes of Over-Confidence.—For many years an aseptic surgical technique combined with sterilization of the skin by simple antiseptics has led us to expect an almost invariable aseptic healing of operation wounds. No great difficulties have been found in securing aseptic results in accidental wounds, even if severe, when they are treated early by a thorough surgical toilet and by mild disinfection. Consequently, at the beginning of the war, few of the younger surgeons could claim any extensive experience of the treatment of wound infections, while the older surgeons, by reason of their senior positions, still more rarely came into contact with septic cases, and had made but little advance on their earlier knowledge. Moreover, virulent infections such as are caused by gas-forming organisms were very rarely seen in England, where the microbic flora of wounds is seldom of fæcal origin. The South African war added little to the advancement of military surgery. The wounds yielded excellent results to 'ordinary treatment.' Complete satisfaction with the methods

employed in civil practice was established. But there the environment of the wounded was extraordinarily favourable to rapid healing, a fact scarcely appreciated at the time, while the wounds inflicted by the projectiles then in use were simple compared with the injuries received in the present war. The battlefields of South Africa were rarely in the neighbourhood of human dwellings and cultivated land. The fighting, for the most part, was on dry sandy and rocky ground. This virgin soil was practically free from harmful bacteria. Serious wound infections were almost unknown. Owing to the shape of the Boer Mauser bullet and to its low velocity when, as was usual, the fighting was at long distances, the injury caused to tissues was far less than that now produced by the pointed German bullet discharged at short range. Badly lacerated shell-wounds were extremely uncommon.

The Awakening.—A very different state of things was and is experienced with the Expeditionary Force in France, where the richly cultivated soil is impregnated with virulent micro-organisms of fæcal origin. Here the men, exposed to the hardships of trench warfare, live in constant contact with highly septic material. Their clothes are saturated with mud or dust heavily charged with manure. All but the simplest rifle-bullet wounds are at once contaminated. Shell and bomb wounds cause a large proportion of the total casualties. Penetrating shell fragments carry with them portions of infected clothing. High-explosive shells and bombs, apart from the direct effects of the violence of the explosion, cause injuries by the projection of earth, stones, and débris of all kinds implanting fæcal bacteria deep in the tissues. Bullet wounds inflicted at short range, and wounds caused by shell fragments travelling at high velocity, are characterized by the extensive damage caused by expansion of the wave of air in advance of the projectile. This internal explosion affects tissues at a considerable distance from the track of the bullet, tearing and separating muscles, bursting blood-vessels, and causing extravasation. Sir A. Bowlby[1] brings microscopical evidence of the widespread damage done to muscular fibres and to other tissues at a distance from the site of injury, and he notes how different are such wounds in comparison with those caused by the crushing and mangling of machinery accidents, where the forces are applied from without. In describing extensive lacerated wounds caused by high-explosive shell fragments, he writes, "The large fragments tear away portions of skin and muscle from limbs and trunk, so that the whole of the calf or part of the thigh or the gluteal or deltoid region may be destroyed, and the tissues from which these have been avulsed are so crushed and lacerated that all the vessels are pulped and extensive areas die. In the neighbouring tissues there is, of course, widespread contusion and extravasation of blood, and, as a result of these injuries, the exposed muscle looks exactly like a mass of mud, for it becomes a homogeneous mass of dark-brown or slate-coloured matter without any striation or vitality."

These devitalized tissues and extravasations form an ideal breeding-place for anaerobic organisms, which multiply with such extreme rapidity that gangrene, toxæmia, and death may occur within a few hours of the injury. When one remembers that the wounded may lie in the open for days before rescue, and considers the improbability of being able to sterilize masses of necrotic tissue by any ordinary antiseptics applied as a first dressing, it is small wonder that early treatment based on civil and South African experiences has utterly failed.

The critics at home who loudly condemned the workers at the front, calling upon them to ask themselves why they were "not getting results similar to those which were obtained by Lister as long ago as 1866," must surely have failed to realize the extraordinary nature of the wounds, the extraordinary environment of the wounded, and the extraordinary bacterial flora infecting the wounds.

The Bacteriology of Gunshot Wounds.

This has been investigated by Fleming[2] and others. The flora is found to be practically the same as that of the highly manured soil. The principal bacteria are of fæcal origin. Wright[3] divides them into two main classes, serophytes and serosaprophytes. Serophytes, which live and multiply in fresh serum, are represented by streptococci and staphylococci. Serosaprophytes, which cannot grow in unaltered serum, include the anaerobic organisms and the larger number of microbes found in wounds.

B. aerogenes capsulatus is a gas-forming anaerobic bacillus found in a large proportion of wounds of recent origin. It does not appear to exert any harmful effect unless especially favourable conditions for its growth, such as the presence of necrotic tissue, pent-up discharges, and blood-clot, exist in the wound. Its action is increased by association with other bacteria, notably staphylococci and streptococci (Fleming). It can produce gas-gangrene and death within twenty-four hours. It is quickly killed by healthy cells, and cannot live in fresh blood-serum. It is therefore a serosaprophyte. When, however, serum is altered by the liberation of trypsin from dead leucocytes, the bacillus finds a favourable environment. It is found in greatest frequency during the first week after infection, decreasing rapidly in later stages. It is rarely met with in civil practice.

B. tetani is found in greatest frequency during the first week of infection, and is rarely seen after twenty days.

The putrefactive bacilli, bacillus X and bacillus Y, are now pathogenic anaerobes, serosaprophytes, chiefly interesting as the causes of foul smell in gangrenous wounds. They are less common than other anaerobes. When found they are an early infection, disappearing in the third week.

Streptococci of fæcal origin, closely resembling and probably identical with the enterococcus described by French authors, are found in all

stages of wound infection, but relatively more often in the first week. They are serophytes growing with extreme rapidity in healthy serum. Their presence is favourable to the *B. aerogenes capsulatus*.

Coliform bacilli are found in all stages, but relatively more frequently in the first week. *Staphylococci* are found in all stages, but relatively more frequently in the first week. They are serophytes, and their presence is favourable to gas-forming bacilli. *Wisp bacilli* are found in all stages, less frequently in the first week.

Microbes of Non-fæcal Origin.—Diphtheroid bacilli do not appear to be found in early stages of infection. Large bacilli are more frequent in the later stages. The pyogenic staphylococci and streptococci are similar to those met with in England as common wound infections.

It will be seen from the above that by the end of the third week of infection the anaerobic organisms may be expected to have diminished to vanishing point, leaving only pyogenic cocci and wisp bacilli. The putrefactive bacilli, together with *B. tetani*, have disappeared earlier. These notes are according to Fleming's analysis of bacteriological examinations in France. All these organisms may be introduced into the wound at the moment of injury. If the wound is extensively lacerated, containing blood-clot and devitalized tissue, the virulent serosaprophytes find a ready culture-medium and grow with extreme rapidity, so that in four hours after injury gangrene may be advanced. Any interference with the circulation, such as shock, tight bandages, tourniquets, or prolonged pressure, reduces the exudation of serum and favours the growth of serosaprophytes.

Sterilization of Wounds.

If complete sterilization of such wounds by chemical bactericides be possible, it is obvious that the attempt must be made very early indeed after injury, and this by some rapid and simple method that does not increase the severe shock from which the patient is suffering, either by greatly increasing pain or by toxic effects from absorption. The chemicals must not be readily decomposed, and they should not be unreasonably expensive. But given a wound of the internal explosion type, ragged, pocketed, with tissue destruction and blood extravasation extending far beyond the actual track of the projectile, and containing septic foreign bodies, the possibility of complete disinfection by the application of chemical bactericides without a preliminary surgical toilet under anæsthesia, whereby all hopelessly devitalized tissues, infecting fragments of clothes, etc., are removed, is extremely remote. Without surgical assistance it is difficult to conceive that anything short of an agent producing a caustic effect sufficient to destroy the tissues to some depth in every part of the wound, and producing an aseptic eschar or a dry pickled surface, could be successful. Very rarely would the condition of the patient permit such painful treatment.

The risks of absorption of chemicals powerful enough to act as caustics are probably not prohibitive, and would be well worth taking if the disinfection were really efficient. At present we have no antiseptic, suitable for use without an anæsthetic in first aid, that can be relied upon to sterilize completely a gunshot wound of the internal explosion type. Lister's cases of compound fractures treated with undiluted carbolic acid are held up to us at the present time as examples of the success of chemical germicides; but the injuries he described are in no way comparable with those now under discussion, and the fact that they were treated under anæsthesia with every surgical requirement at hand puts them out of court when considering bactericides as a first aid in the field. In civil practice the modern surgical methods of treating smashing compound injuries lose nothing in comparison with Lister's methods. What he achieved by slow removal of the damaged and potentially infected tissue by means of the formation and separation of an aseptic crust or scab, is now accomplished by the knife. The devitalized tissues are excised. The wound, disinfected with innocuous antiseptics, and closed with or without artificial drainage, remains aseptic, and heals more often than not by first intention. There is no doubt that gunshot wounds, when they receive the same thorough surgical toilet within the first six hours, can be rendered practically sterile by simple antiseptic methods. Whether these methods should employ chemical antiseptics, heated oxygen, or should be 'physiological' only, is a matter of individual choice. Clinical results show that remarkable success attends them all, provided measures are taken to prevent accumulation of dead fluids in dead spaces.

Treatment Before Sepsis is Established.

The critics who cried 'Forward,' and the critics who cried 'Back,' were right in condemning the practice of 'ordinary methods' as used with over-confidence at the beginning of the war; and they did good work on the one side by calling attention to the physiology of infected wounds, and on the other by stimulating the search for an ideal antiseptic. We were forced into critical comparisons of opposite methods and theories. More light was thrown on Nature's mobilization scheme for the defence of the human body. A hazy faith in our antiseptic methods was sharply challenged when we were made to realize how greatly the germicidal power of chemicals is reduced in the presence of wound exudations—blood and pus—as compared with their effect in water. But something to the credit side of antiseptics was added by those who taught that many of the accepted disadvantages of antiseptics might be shown to be really advantages. The coagulation of albumin, for instance, is said to become beneficial under certain circumstances if the disintegration of the coagulated material allows a slow but continuous release of antiseptic—the so-called 'reservoir' or 'depôt' action; and even the destruction of phagocytes themselves is

claimed to be followed by a general beneficent leucocytosis (Léon Bérard and Auguste Lumière[4]). Fear of toxic effects from absorption of bactericides need not be an obsession, while local irritation may prove beneficial by reason of the creation of a desirable hyperæmia. But the critics have not brought us any nearer to a solution of the problem of sterilizing recent gunshot wounds without a preliminary surgical operation. How then are we to treat these early cases when, from pressure of work, the unfavourable condition of the patient, unsuitable environment, or any other cause, surgical measures to remove foreign bodies, clot, and damaged tissue are impossible, when every hour of delay adds enormously to the multiplication of septic organisms? The treatment of shock, the immobilization of shattered limbs, the cleansing and sterilization of the skin around the wound, are obviously necessary measures; their details need no description here. We seek means of inhibiting septic growth and of increasing Nature's resistance to infection, until such time as a thorough wound toilet can be made under some form of anæsthetic. Antitetanic serum and 'mixed' vaccines can have no better opportunity of proving their value. The virtue of the serum is well established. From the vaccines in these early cases much is expected.

Any antiseptic applications designed to inhibit bacterial growth in the depths of the wound must have the following positive qualities. They must be able to penetrate into all the pockets and recesses of the wound. They must be of a nature and consistency that does not allow them to flow readily out of the wound, either from their own liquidity or by discharges washing them away. They must be capable of exerting a slow continuous action. Thick pastes of various antiseptics in a waxy medium have been suggested; but it is obviously impossible to force stiff pastes into all the interstices of ragged tissue by squeezing tubes. They cannot penetrate by gravity alone. They have the disadvantage of clogging wound exits, so that if they fail to reach all parts they may do more harm than good. Hypochlorous acid in solution is unsuitable in these cases, since its action, powerful as it is, diminishes rapidly. In the form of 'eupad' powder its effect is less evanescent; but powders have the same defects as pastes; they cannot be forced to permeate the wound cavities, and they obstruct drainage by caking. Antiseptics emulsified in a medium of balsam-like consistency would appear to meet some of the difficulties. Madden,[5] treating severely lacerated and dirty gunshot wounds in Egypt, has found a **Balsam** composed of eucalyptol, guaiacol, and iodoform, each 10 parts, balsam of Peru 30 parts, ether 100 parts, highly satisfactory after the usual surgical toilet. This preparation suggests possibilities of value as an immediate application. **Glycerin Emulsions** of antiseptic crystals, combining as they do good permeation, adhesion, and continuous action, with lymphagogic qualities, are promising. The '**Salt Pack**,' to be described later, cannot be relied upon to inhibit septic growth completely; moreover, in these early cases it is often an extremely painful dressing, and therefore

unsuitable for field work. A pack of sponge cuttings charged with antiseptic balsam or emulsion arranged around open-wire tubes is suggested as a simple method satisfying many of the requirements, and offering some chance of delaying serious infection for several hours.

Treatment when Sepsis is Established.

We are on much firmer ground when we approach the subject of the treatment of cases which can be brought early to the operating-table. Here, after freely opening up the wound, excising devitalized tissues, and removing foreign bodies, there is a very wide selection of methods, all giving excellent prospects of complete sterilization where infective processes have not yet commenced, and of rapid arrest of bacterial growth when sepsis is already established. The choice will be influenced by the necessities of the case. Where constant skilled attention can be given to refresh the antiseptic at frequent intervals either by irrigation or by changing or rechanging the dressing, **Hypochlorous Acid** is at present very popular. But where the patient has to be transported to a considerable distance immediately after the operation, and under circumstances giving no opportunities for careful individual attention, an antiseptic less evanescent is required. The special claims of urea and of salicylic acid to keep up a continuous action will be considered in detail later.

'Physiological' treatment trusts to the salt pack in these cases to the entire exclusion of all chemical antiseptics, with the exception of those used in deodorizing top dressings and cleansing the skin.

There is a method, neither physiological nor antiseptic (so-called), which in the hands of Reverchon, Viquot, and Vachu[6] has produced complete sterilization with rapid healing, unaccompanied by after-pain, when applied under an anæsthetic to recent wounds. This is the **Heated Oxygen** method. It is employed as follows. A very thorough surgical toilet is made, opening up the wound widely. The whole surface of the wound in all its extent is cauterized by a jet of oxygen gas heated to a temperature of 700° C., until an eschar of some millimetres in depth is produced throughout. The most extensive 'explosion wounds' when so treated have been completely sterilized at one sitting, and have remained sterile under further treatment of warm oxygen douches, which cause no pain. The cases illustrating this method, described in detail, are perhaps the most remarkable examples of successful abortive treatment to be found in the literature of the present war. An electric current of 100 volts is required to work the oxygen apparatus. Such a current can often be obtained quite near the front; but any treatment necessitating special and expensive apparatus cannot be extensively employed. The choice will lie generally between 'physiological' methods and antiseptics.

'Physiological' Methods.

The teaching of those who advocate treatment by 'physiological' methods only must be considered in some detail.

Wright and others find that blood-serum has some hitherto unsuspected properties. Apart from its agency in bringing forward phagocytes on the tide of its flow into the wound, it has itself a powerful bactericidal action of a selective kind, for while it can destroy the anaerobic micro-organisms and most other bacteria, it has no inimical action in an unaltered state, upon streptococci and staphylococci. Leucocytes in blood-serum destroy microbes without distinction; but in the fight the bodies of the leucocytes that perish, decompose and liberate a ferment, trypsin, which robs the serum of its antiseptic power. Moreover, pus, by increasing the coagulability of blood-fluids, tends to form a sticky deposit of fibrin on the walls of the wound, thus checking or preventing the flow of fresh serum through these infiltrated walls to take the place of that which has been spent in the deep tissues or converted by trypsin into a favourable medium for bacterial growth in the wound cavity. So that it would appear that in the early stages of wound infection, when the saprophytic anaerobic organisms are in force, it will be better to rely on the bactericidal power of fresh serum than to accept the boomerang help of the phagocytes, whose temporary success leads ultimately to defeat unless the altered serum is rapidly removed by drainage.

But Nature has in reserve another antibacterial force. Blood is antitryptic, and this power is exercised in response to invasion, and therefore, to some extent, protects its serum from digestive action, and thus phagocytosis may not recoil immediately with disaster. It is part of the 'physiological' method to increase the immunizing response by vaccines injected at the earliest possible moment. The main treatment is directed to starting a flow of fresh lymph by dissolving the coagulated material that blocks the outward flow, and endeavouring to keep up this flow continuously. This the method claims to secure by the application of a **Hypertonic Salt Solution** to which is added **Sodium Citrate** to assist in the dissolving process. The hypertonic solution is to some extent inhibitory to the growth of organisms. A preliminary surgical wound toilet and the sterilization of the surrounding skin are as necessary in this form of treatment as in any other. If the hypertonic saline in the strength of 5 per cent or over has been successful, the gas-generating and the putrefactive bacteria will have succumbed. The wound should be clean in appearance, and pyogenic cocci the only important infection. Now is the time to encourage the phagocytes, for upon them falls the brunt of the battle with the serophytes. To this end the hypertonic solution is replaced by an isotonic or **Normal Saline** solution, and an efficient drainage established. When the pyogenic cocci have been subdued, secondary closure of the wound is advised. Such in brief outline is the 'physiological' method. That hypertonic solutions exert a lymphagogic

action appears to be an accepted fact; but it seems that this can take place only when the tissues are bare, as they are after wound excision or when coagulated material has been removed, and when a wound is in this condition one would expect considerable lymph-oozing with or without the aid of lymphagogues. Nor is it conclusively shown by clinical results that hypertonic saline is to be preferred to fluid-attracting applications such as magnesium sulphate, or preparations with a glycerin basis. It may be permissible here to quote Sir A. Wright's explanations of the physical and physiological action of concentrated salt solutions. The writer has made the following arrangement of the paragraphs in order to show the tantalizingly contrary effects produced during the action of the same solution.

A concentrated salt solution will attract water; and except in the case where a membrane which is impermeable to albumin is interposed, the outflowing current of water will carry out with it the whole of the protein substances which it holds in solution.

It will inhibit leucocytic emigration into the cavity of the wound.

Brought into direct application upon leucocytes, a hypertonic solution (5 per cent salt) will disintegrate leucocytes, setting free the tryptic ferment they contain.

It will inhibit the action of the tryptic ferment set free in wounds.

It will inhibit coagulation, and so prevent the sealing up of the orifices through which lymph pours into the wound.

It will prevent phagocytosis in the cavity of the wound.

It will inhibit microbic growth.

The virtues of the hypertonic solution, therefore, depend upon its strength. So soon as it dilutes itself by the water it attracts from the tissues, the bacteria get the upper hand. When the tissues of the surface of the wound are not lying bare but are covered with sloughs or coated with fibrin, it is claimed that hypertonic saline, by breaking down leucocytes, sets free tryptic ferment, which comes into play when the solution is diluted by its own action, but tryptic ferment is favourable to the growth of infection. What Shakespeare says of strong drink we may say of strong saline: "it provokes and it unprovokes." It would seem that in suitable wounds strong saline may perhaps prove efficient as a starter of physiological processes, but as the conditions must vary in different parts of extensive gunshot wounds, and its good physiological action is so rapidly turned to evil and only its mild antiseptic or inhibiting effect remains, the 5 per cent hypertonic saline solution does not appear to be a very formidable rival to acknowledged antiseptics. Critics of Sir A. Wright's theories deny that hypertonic saline acts as a lymphagogue, declaring it to be a hydragogue only, "extracting water from intact cells, blood-

vessels, and closed lymph-spaces" (Kenneth Taylor[7]). While its osmotic power to draw lymph to itself is denied, it is suggested that hypertonic solution, by abstracting fluid from cells in the meshwork of fibrin blocking the surface of wounds, may cause a shrinkage of these cells, and so open up obliterated channels, allowing free passage to the lymph; but this would be only a temporary flow, "for once a flow is established, the current of lymph outwards will tend to counteract the diffusion of salt inwards. Thus as soon as the surface becomes pervious, the presence of hypertonic solutions cannot be expected still further to increase the flow" (Parry Morgan[8]).

When we come to inquire into the clinical results of the hypertonic treatment, we find little recorded material to study. The treatment by a 5 per cent solution seems to have retired in favour of the **Salt Pack.** In this method the wound is "packed with tabloids of salt, holding these off from actual contact with the tissues by several folds of gauze. The salt here comes into application in the form of a saturated solution all over the surface of the wound, condensing the tissues until they become impermeable to lymph, and at the same time pickling them in such a way as, perhaps, to restrain all microbic growth in their interior" (Wright). The salt pack developed from Lawson's employment of salt tablets within drainage tubes to maintain the strength of the solution.

A further modification was introduced by Gray,[9] who packed the wounds with gauze containing salt tablets within its folds. A still further modification is the salt sac described by Hull[10] as an improvement on previous methods. "It consists of a two-walled sac of suitable size made of bandage, between the layers of which four layers of gauze are placed. The interior of the sac is filled with salt, and the tail of the bandage forms a drain." These sacs are used with or without drainage tubes. A top-dressing of cotton-wool is applied liberally and firmly bandaged. It is claimed that a dressing of this kind need not be changed for five or six days unless a rising pulse-rate, increasing œdema of the limb, or signs of streptococcal infection are present. Some offensive odour from dressings a few days old seems not to indicate any harmful process in the wound. Eupad powder dusted under the outer layers of the dressing diminishes the odour. Roberts and Statham find Dakin's chloramine-T powder most efficacious in removing the objectionable odour. A thorough preliminary surgical toilet under anæsthesia is just as necessary in the salt-pack treatment as in any other attempt to disinfect gunshot wounds: indeed, the excision of the wound may extend to the removal of the whole belly of an infected muscle in its sheath, and thrombosed veins should be dissected out to their full extent and excised (Roberts and Statham[11]). The pioneers of the salt-pack method maintain that it produces a lymph lavage and is therefore a physiological proceeding; but the clinical results show that the lymph-flow ceases after the first twenty-four hours, and that the wounds keep often 'wonderfully dry' (Gray[9]). A profuse serous oozing is what one may expect without the aid of

any salt pack, after a surgical removal of necrotic tissue to the extent of leaving a freely-bleeding surface.

The salt pack has been re-born of physiological parents, but it looks as if, before long, it may disassociate itself from the parental principles and be proclaimed as free and independent an antiseptic as it was in the old days when a handful or two of salt well rubbed in and covered with a pad of oakum disinfected the lacerated cat-'o-nine-tail wounds of flogged deserters. Physiological agent or antiseptic, or both, there is increasing evidence to show that the salt pack is a valuable method in attempting to inhibit infection by anaerobic organisms, and of use in wounds already septic. A dressing that does not require to be changed for a week claims a big advantage over any that have to be refreshed or renewed every few hours. Salt is cheap and convenient, and without toxic effects; but, on the other hand, it often causes severe pain, and an anæsthetic is generally necessary for the first re-dressing. The success of the treatment depends greatly upon the thoroughness of the preliminary surgical measures and the ability to pack every pocket in the wound.

Treatment in the Later Stages of Infection.

In the later stages of infected wounds when the anaerobes have been suppressed, when the pyogenic cocci are in the ascendency and the wound is freely discharging pus, chemical antiseptics are altogether disappointing, for in pus or blood or serum, or in the tissues subjacent to the wound surface, the efficiency of chemical antiseptics is greatly reduced, since the antiseptic expends itself not only on the micro-organism but on the protein substances of their environment (Dakin[12]). Indeed, before the introduction of **Hypochlorous Acid** in the form of Dakin's solution, or of **Eusol**, which combine with albumin as a chloramine that is itself highly antiseptic, the insufficiency of antiseptics in suppurating wounds had led many surgeons to prefer normal saline solutions in all septic wounds met with in civil practice. Recent investigations by Wright, Morgan,[13] and others, show that the bactericidal powers of most antiseptics are enormously diminished in the presence of pus. Morgan states: "For the purpose of washing out a wound, neutral hypochlorous solutions are by far the most potent of the antiseptics usually employed, and are effective if diluted to 1–800 available chlorine, or 1–4 of the strength usually dispensed. Mercuric antiseptics 1–1000 and carbolic acid 1–80 never sterilize completely, but kill a very large number of microbes and delay the appearance of the growths of those which remain. Hydrogen peroxide by itself has very little bactericidal power, but when added to other antiseptics with which it is not incompatible it increases their bactericidal power on pus organisms." He also forms the following conclusions from experiments. When pus is present in the proportion of four parts to one of antiseptic, organisms may grow freely when the following are the antiseptics used: mercuric salts 1–200, carbolic acid

1–60, iodine 1–200, boracic acid 1–20, chloramine 1–20, hypochlorous solution 1–200 available chlorine. Organisms also grew when salt solution 20 per cent was used. The pyogenic organisms, as regard their growth on pus, are among the least affected by ordinary antiseptics. "For washing out a wound when the antiseptic would be in great excess, hypochlorous solutions are very potent and carbolic acid comparatively weak; on the other hand, for an application in a dressing when pus would tend to be in excess, hypochlorous solutions are practically useless, whilst carbolic acid, although it has the disadvantage of interfering with the activity of the leucocytes, is fairly efficient."

The effect of normal or **Isotonic Saline** on wounds that have been freed from putrefactive bacteria, but remain infected with the pyogenic cocci, is, for a time, undoubtedly beneficial. Phagocytes are attracted. Whether they are "carried forward by a chemotactic movement in the direction of the free surface upon which the physiological solution is imposed" (Wright), or "emigrate, stimulated by a slight effect that physiological saline may possibly have in increasing the non-directed wandering movements of the leucocytes" (Morgan) is debateable matter. Clinically, the results of irrigation with normal saline are generally satisfactory. The cocci are subdued and almost exterminated; but the treatment, if kept up too long, causes a dropsical condition of the cells, leading to a water-logged condition of the wound. Most surgeons will prefer to vary the treatment by using appropriate antiseptics, and there are few who will not apply them to the wound-neighbourhood to avoid secondary infection.

Preparations used in the Treatment of Gunshot Wounds.

The introduction of suitable methods of employing **Hypochlorous Acid** in the treatment of infected wounds (Dakin, Lorrain Smith, Drennen, Ritchie, and Campbell) has supplied an antiseptic which is claimed by its many supporters to be superior to all others. Its preparations, known as Dakin's solution of sodium hypochlorite, and Lorrain Smith's 'eusol' and the powder 'eupad,' are now too well known to require description. There is little to chose between the solutions when used as applications. They are all extremely inexpensive and easily procured. The Clinical Report to the Medical Research Committee[14] on the application of eusol contains the following conclusions: Clinical experience has proved it to be a non-irritating and efficient antiseptic, highly destructive to bacteria and non-toxic to the tissues. "In lacerated and contused wounds and in compound fractures, such as are met with in military practice, it is the most efficient antiseptic we possess." It is most efficacious during the period of progressive sepsis. Sepsis is controlled in two or three days, and granulations rapidly cover the surface of the wound. Of recent accidental wounds treated immediately in the surgical out-patient department of the Edinburgh Royal Infirmary, 86 per cent remained aseptic. A higher percentage can be expected when patients are under

complete control. When septic processes were already present in the wound, treatment was by frequent syringing, changes of soaks, or baths. Hypochlorous acid forms a compound with the albuminous substances of the exudate, and is thereby decomposed, but the compound is itself an antiseptic. Eusol was found to bring about rapid separation of sloughs, and to produce healthy granulations more quickly than any other antiseptic. The preparation must reach every part of the infected surface. In acutely inflamed mucous surfaces eusol may produce pain; in chronic inflammation it is well borne.

Alexander Miles,[15] from observations on grossly-infected gunshot wounds which had been treated previously with antiseptics, states that "in eusol we have an efficient and safe antiseptic agent which more generally meets the requirements of the military surgeon than any one of those previously available." Carrel,[16] writing on the abortive treatment of recent gunshot wounds, states: "It has been possible to sterilize completely infected wounds, and to close them like aseptic wounds." He recommends the use of hypochlorous acid at the dressing stations. After disinfection of the skin by iodine, gauze soaks are applied without any impermeable covering, and the patient is transported as rapidly as possible to the ambulance station, where the earliest possible surgical toilet is given and hypochlorous acid brought into contact with all the interstices of the wound, and subsequently applied continuously, or refreshed, every two hours. Dalton,[17] writing on cases of gunshot wounds received from the Gallipoli Peninsula and treated on board ship with Dakin's solution, makes the following notes as to its advantage over other antiseptics: (1) Its simplicity and cheapness; (2) Non-toxic and non-irritating, it may be used safely in large quantities; (3) Deodorant action, fœtor from gangrenous tissues usually disappearing in twenty-four hours; (4) Rapid separation of sloughs and appearance of clean granulation tissue; (5) The comparative infrequency of re-dressing; (6) Refreshing through rubber tubes may be safely entrusted to imperfectly trained orderlies. In profoundly septic cases the hypochlorite solution was injected into the tubes every two hours for the first twenty-four to forty-eight hours, and less frequently as the wound cleaned. Many foul and stinking cases became perfectly clean within from three to four days after treatment.

Details of naval cases from the Jutland action are not yet published; but the writer has knowledge of many severe shell wounds, including compound fractures, which were treated within thirty-six hours of injury on abortive lines by excision of damaged tissues, disinfection with eusol, and *closure of the wounds*, which healed by first intention. It must be noted that such naval cases are not exposed to infection by virulent micro-organisms, and that they receive immediate first aid.

Cordova,[18] who has investigated the effects of intravenous injection of eusol on animals, publishes tables showing the efficacy of 10-c.c. doses of the solution in artificially produced infection and toxæmia.

He regards hypochlorous acid intravenously administered as of therapeutic value, since the antiseptic apparently delays the development of bacteria and destroys their toxins. He suggests that the destruction of toxins may be in the nature of a protein coagulation. Lorrain Smith, Ritchie, and Rettie have treated successfully a case of puerperal septicæmia by intravenous injections of 100 c.c. of eusol, which was repeated after twenty-four hours without ill effect.

Fraser and Bates,[19] acting on the suggestion of Lorrain Smith, have treated cases of acute toxæmia secondary to gas gangrene by intravenous injections of eusol containing 0·5 per cent of hypochlorous acid, to which was added 8·5 grms. of sodium chloride per litre. Injections of from 40 c.c. to 70 c.c. were given with most satisfactory results in cases which were considered hopeless.

From laboratory experiments upon the action of Dakin's solution upon malignant œdema spores, Schütze,[20] noting the interference of serum with the germicidal power, concludes that there is "no direct lethal effect of the solution on similar resistant spores embedded in the tissues of a wound, unless the serous fluid surrounding those spores could be replaced by irrigation to well above 95 per cent of the hypochlorite solution."

Louisa Garrett Anderson[21] and collaborators claim that **Salicylic Acid**, applied in a suitable form to septic wounds, can often save cases where other methods have failed. Applied to a wound in crystalline form, it does not dissolve sufficiently freely to cause necrosis; it exerts a continuous antiseptic and inhibitory action. It is stated to be a positive chemotactic agent and a lymphagogue. It has been used in the form of a saturated solution in alcohol, of which one or two drachms are added to the last funnelful of saline with which the wound is injected. As a thick paste (1 grm. acid, 9 c.c. saline) it has been applied with success to the cut surfaces of long bones in septic amputations. Prepared with gelatin (2 to 4 grms. of pure salicylic acid to 100 c.c. sterile gelatin) to permit a diminished quantity of the drug to be used and retained in the wound by the viscosity of the medium, the fresh preparation while in the fluid state is poured into the crevices of the wound. Salicylic acid causes some smarting pain.

From laboratory tests, St. Clair Symmers[22] and Sinclair Kirk conclude that **Urea** acts as an antiseptic even in the presence of blood, especially in infection from non-sporing micro-organisms. It is innocuous to animal tissues, and non-toxic in the quantities that can be used in wounds. Dressings need be changed only once in forty-eight hours. The processes of repair are not retarded. It prevents suppuration arising in wounds from chronic blood infections. The urea is applied in solid form. It is conveniently carried in envelopes of oil-silk or other protective material to prevent absorption of moisture and consequent caking. Cases are recorded showing that septic cavities after scraping have been filled with urea and sewn up without drainage, aseptic healing by first intention being secured. A considerable amount of pain is caused in some cases; and this, together with its

tendency to cake, would limit its use as a first-aid application unless a means of mitigating these defects, such as mixing it with some other agent, can be found.

Kenneth Taylor[23] has shown that clinical experience with **Quinine Hydrochloride** has been consistent with results obtained in the laboratory. Experiments in vitro had demonstrated that: (1) Quinine has bactericidal properties especially marked in the case of *B. aerogenes capsulatus*. It is ten times more effective against this bacillus than carbolic acid. It does not inhibit phagocytosis. It is antitryptic. It forms no stable chemical combination with proteins, so that its activity is not greatly reduced by serum or pus. It is non-irritating and non toxic in adequate dosage. It is stable, and not prohibitively expensive. The clinical results are based on 125 cases of infected wounds, the majority treated within forty-eight hours of injury. Seventy per cent were infected with gas bacillus, and all with streptococci, staphylococci, and the usual flora of putrefactive bacteria. About half were open fractures of long bones. Soaks of a 1 per cent solution of quinine hydrochloride in cold boiled water were used as dressings. When a continuous drip was required, $\frac{1}{10}$ per cent quinine, with the addition of $\frac{1}{10}$ per cent hydrochloric acid or of 1 per cent alcohol, was used. Subcutaneous injections of this solution into the tissues about the wound were occasionally employed. The clinical results noticed include a rapid improvement in the appearance of the wound, speedy disappearance of sloughs and vanishing of putrefaction odour, decrease of discharge, and rapid appearance of granulations. Quinine hydrochloride seems to have a specific action upon the gas bacillus and a relatively feeble action upon *B. pyocyaneus*. We are not told if this series of cases received the usual surgical toilet before treatment with quinine. No mention is made as to whether the dressing causes pain.

Optochin is a methyl derivative of quinine which has been reduced by the introduction of a further two hydrogen groups. It is an alkaloid derived from cuprea bark, a white crystalline powder soluble in 1–10 of water. Wright obtained striking bactericidal effects with optochin on the pneumococcus in the presence of blood and serum. Inman[24] has investigated its power in the case of enterococci. In freshly prepared aqueous solution left in contact with the microbes for twenty hours, optochin killed the enterococcus in two-million-fold dilution. Exposure to light soon diminishes the bactericidal activity. In serum, optochin kills the enterococcus in a concentration of 1-400,000, and the action of the drug becomes more evident the longer it is allowed to remain in contact with serum and bacteria. In efficient dilution it does not interfere with phagocytosis nor with emigration of leucocytes. It has inferior penetrating power. No clinical results are given.

Magnesium Sulphate Solution is brought to notice by Morison and Tulloch[25] as a lymphagogue superior to sodium chloride in the treatment of septic wounds by virtue of its being absorbed with difficulty,

thus causing less waterlogging of tissues and producing a healthier type of granulation. It is claimed to have the property of interfering with the digestive activities of pus, and to some extent inhibits the growth of streptococci, *B. coli*, and *B. pyocyaneus*. Any real antiseptic properties are disclaimed and its use is suggested only in cases which have received a thorough surgical toilet and preliminary cleaning with antiseptics. It is employed as a saturated solution—magnesium sulphate 4 oz. dissolved in 10 oz. of glycerin and 30 oz. of boiling water, and sterilized in an autoclave. Recent wounds, after preliminary treatment with carbolic dressings lasting for twenty-four hours, are syringed with the solution of magnesium sulphate and lightly packed with gauze moistened with the same. In later and septic wounds the treatment by carbolic acid is omitted; dressings are changed only once in twelve hours. Suppuration is claimed to disappear and sloughs to separate rapidly, the granulation never becoming flabby or œdematous. Epithelial growth is vigorous. The treatment may be continued until the wound is healed.

Garlic Juice has been advocated as an application in suppurating wounds (Serrell Cooke[26]). The juice, diluted with two to three parts of distilled water, is stated to bring about a noticeable improvement in twenty-four hours, and a decided improvement in forty-eight hours. Purulent discharge, pain, and inflammation are diminished. It appears to act as a lymphagogue, and to cause œdema of granulations if long continued. In the weaker solution it is not painful.

Rutherford Morison's[27] **Bismuth and Iodoform Paste** ('Bipp') is a compound of bismuth subnitrate 1 oz. by weight, iodoform 2 oz. by weight, paraffin liq. q.s. to make a thick paste. It is claimed for this preparation that after a thorough surgical toilet and cleansing with spirit, septic wounds can be sterilized so that "healing by first intention is made possible under infrequent dressings and without drainage further than that allowed for through gaps left by *interrupted* sutures." Acute abscesses opened, cleaned, filled with 'bipp,' and closed by interrupted sutures, heal by first intention without further pus-formation. The paste completely fills the wound. A sterile gauze and pad dressing is applied and kept in position by sticking-plaster and bandage. This dressing requires no change for days or weeks if the patient is free from pain or constitutional disturbance. Almost dry and painless healing takes place. Iodoform poisoning is too rare a complication to cause any anxiety. The greater part of the paste is gradually extruded as the wound heals. It is suggested that the paste stimulates osteogenesis, since rapid union of fractures is observed during its use. At present there is no record of 'bipp' having been employed as a first-aid application. Its consistency would make it difficult to apply in the field. The introducer, realizing the anaerobic conditions produced by the presence of paste, advises free drainage, together with the paste dressing, in recent wounds, when there is risk of gas-gangrene infection.

Mayer[28] recommends **Hypochlorite of Magnesia** as an antiseptic,

since it is not caustic and does not require to be neutralized. The solution is prepared by mixing 190 grms. of magnesium sulphate dissolved in 2 litres of water and 100 grms. of chloride of lime dissolved in 2 litres of water. The precipitate is allowed to settle and the solution filtered. In an emergency a level teaspoonful of chlorinated lime, a heaped teaspoonful of Epsom salts, in a tumbler with 4 oz. of vinegar, and strained after standing for fifteen minutes, is recommended by Stewart, of New York.[28]

Calendula (p. 13), **Ambrine** (p. 20), and **Ultra-violet Radiation** (p. 53) are referred to on pages cited.

The following conclusions are suggested by the above review of various treatments :—

If conditions permit the wounded to come under thorough surgical care within a few hours of injury, abortive treatment is possible. In such cases the choice of antiseptics is almost immaterial. The preference would be given to the least painful and least expensive. Hypochlorous acid answers all requirements, and it has been proved efficacious; it may be considered sufficiently reliable in wounds not exposed to fæcal organisms, to justify the complete closure of the wounds in suitable cases, notably in naval ones. When, from the probability of contamination with anaerobic bacilli, it is hazardous to close the wound, the cleansed wound is packed with gauze charged with some antiseptic or inhibiting preparation arranged around one or more drainage tubes. The selection of this preparation will depend upon the degree of after-attention it is possible to give to each particular case. Where constant attention can be given to refresh dressings and to avoid secondary infections, hypochlorous acid may still be relied upon to offer a good chance of avoiding sepsis. Where after-attention cannot be given, or when from the general condition of the patient it is desirable to disturb him as little as possible, some preparation less evanescent in its action must be chosen. Most surgeons will prefer an antiseptic to the physiological salt-pack. In such cases as these, when it is a matter of keeping a wound aseptic without interference for two or three days, the question of expense is of minor importance. Painlessness, continuous bactericidal action, and freedom from toxic effects are the chief requirements. A saturated solution of salicylic acid appears to be better qualified, or perhaps less open to objection, than any other antiseptic.

When infection by pyogenic microbes is established, the older antiseptics are generally found useless in the presence of the pus. The recently introduced preparations of hypochlorous acid, together with efficient drainage, give results that entirely satisfy many experienced surgeons who have hitherto abandoned antiseptics in these cases in favour of normal saline irrigation. But there are occasions when hyperchlorous acid fails, and drugs such as salicylic acid, urea, and quinine, locally applied, or compounds such as Madden's balsam or Rutherford Morison's paste, prove successful.

It will be observed that treatment is sharply divided into two methods, the wet and the dry. The one encourages a constant wound discharge and practises a frequent or continuous removal of such discharges by flushings, irrigations, or baths of the selected solution. The other, by filling dead spaces, allows no fluid to accumulate, checks discharge, and at the same time keeps up a continuous antiseptic action which eventually sterilizes the wound without the necessity of frequent renewal of dressings. The dead spaces are filled either by gauze saturated with the agent or by means of the agent itself. The selection of the method will depend greatly upon the internal topography of the wound and the extent to which it has been laid open and access obtained to all recesses.

In the hands of skilful pilots ready to alter course so soon as there are signs of danger ahead, the dry method has many advantages. It increases enormously the comfort of the patient, who is spared the disturbance and the pain of frequent dressings and irrigations. It reduces very greatly the labours of the hospital staff.

When dead spaces cannot be obliterated, there is a wide choice of means of drainage and irrigation. There can be no doubt that the ordinary rubber drainage tube, if carelessly used, may cause harmful and even disastrous results, such as erosion of blood-vessels and perforation of intestines, and to a lesser degree may devitalize adjacent tissue sufficiently to allow sepsis to gain an advantage. Gray[29] insists on the necessity of following the principle, when drains are used, of introducing such drains "down to but not into" the important cavity or structure which has to be drained. This refers especially to joints, the brain, and to the neighbourhood of comminuted fragments of bone. He draws attention to the great danger that exists in leaving drainage tubes between the bones of the forearm or leg, from the probability of pressure causing sloughing of the interosseous membrane, secondary hæmorrhage, or paralysis of nerves. When possible, rigid drains should always be discarded for soft ones. Variations in the shape of the ordinary tubular rigid rubber drain have been suggested with the view of increasing their efficacy. Many forms of wire drains have been introduced. Chaput[30] advocates filiform drainage by means of threads of silk or wire, catgut, etc., or by small bougies. He drains abscess cavities by passing filiform drains through them by means of suitable needles, or by introducing the drains through punctures by the aid of forceps. He claims that these drains are safer, more effectual, and less painful than tubes, and that their action is more continuous and their presence less liable to cause infection.

Gas Gangrene.

The cases of gas gangrene are now relatively fewer than they were in the early days of the war. Improved conditions of evacuation of the wounded and improved methods of early treatment have checked the onset and lessened the severity of the disease. The micro-

organisms causing infection are of fæcal origin, and are found to a considerable depth in the highly-manured soil of the Western battle-fields. There are many kinds of gas-producing organisms. The most important are *B. aerogenes capsulatus* (also called *perfringens*), *B. œdematicus*, and the *Vibrion septique*. With the anaerobic bacteria are frequently associated streptococci (enterococci), while some pathologists consider the presence of streptococci increases the activity of the saprophytes. Emery[31] denies that streptococci play an important part, pointing out that in the extending margin of the lesion, *B. perfringens* alone is found. The anaerobic organisms under ordinary circumstances are non-pathogenic. The *B. perfringens* is present in the early stages of nearly all gunshot wounds in France, and causes no special pathogenic effects if the wound is not in a condition to favour its growth. The bactericidal power of serum in a minor degree, and phagocytes to a greater extent, combat the infection. Emery, from experiments, concludes that "given an abundant and constantly renewed influx of leucocytes, the infection, however great, can be kept at bay, and that a zone of such leucocytes would form in the body a barrier against infection." He believes that the toxin of the bacillus has a chemotactic power over leucocytes.

The *B. œdematis maligni* occurs frequently. Dean and Monat[32] isolated a pure culture in 15 out of 18 cases. "All were cases in which considerable laceration and necrosis of tissue had occurred, and all were characterized by an offensive discharge. . . There is apparently no reason to think that the presence of this micro-organism in a wound is necessarily of serious import. There appears no evidence that its presence is constantly associated with any particular group of signs or symptoms. Its presence is an indication of the occurrence of gangrene, for it has little or no capacity for multiplication in living tissue." Inoculation experiments with both cultures of *B. perfringens* and *B. œdematicus* are not often attended with fatal results to the animals. It is assumed that neither bacillus is capable of multiplication in living tissue; but in blood-clot, and in dead tissues, especially in dead muscle, they find suitable environment and produce toxins stated by Barger and Dale to be ammonium salts. These toxins are said to kill the adjacent tissues and thus to spread the gangrene. Kenneth Taylor[33] suggests that the extension is caused by pressure of the gas generated bringing about the death of neighbouring tissue by pressure and by disintegration. He considers that the exotoxin must play an important part in the infection, but it is insufficient to explain the extreme degree of intoxication. Also, the rapid course is not due to an invasion of the blood by bacilli, since it is extremely rare to find bacilli in the blood before death, but it is accounted for by the absorption of the autolytic products of protein digestion of the destroyed tissue.

Taylor considers that the gas produced by *B. aerogenes capsulatus* (*perfringens*) is of little or no importance as a toxic factor. The extension by the mechanical action of the pressure is usually, if not

always, the most important part of the infection. This pressure specially affects muscles, causing fragmentation and disintegration of the fibres. The bacteria produce gas by the aid of the muscle sugar. Whether the disease should be considered as mainly a muscle disease is disputed, but the idea is gaining ground. Cuthbert Wallace[34] notes that it is rare to meet gas gangrene without a muscle injury, and the condition is seldom dangerous when muscle is not involved. He suggests that the toxicity of the *B. aerogenes capsulatus*—at one time innocuous and at another extremely violent—may depend on the nature of the medium in which it is implanted. It is pointed out that the disease runs up and down the wounded muscles from the seat of the lesion, often confining itself to groups of muscles, so that it is rare to find all the muscles of a segment of a limb involved unless the main blood-supply is cut off. Special stress is laid on the fact that the condition of a limb affected with gas gangrene is quite different from that of cellulitis, for in gas gangrene the muscles are chiefly affected. Crepitation is usually a comparatively late phenomenon, due to the escape of gas from the muscles into the areolar tissue. In discussing the part played by the gas in the spread of the disease, Wallace shows that an incision into a tense and tympanitic limb proves that the increased tension is caused by swelling of the muscle due to the gas within it. This pressure exerts its deleterious effect not only by its pressure on neighbouring and uninjured muscle, but separates the muscle fibres from one another, allowing bacteria to multiply in the spaces between.

There are many types of gas gangrene. The rapidity of onset varies greatly. In some cases gas is generated within two hours of the injury; in others the signs are delayed and the disease may be less severe. When the disease is localized, it causes little or no toxæmia. Usually the gangrene spreads very rapidly, especially when large masses of muscles are involved, such as in shell wounds of the buttock. A tympanitic condition usually precedes crepitation. The neighbourhood of the wound or the whole limb swells; some brownish discoloration of the skin appears. The wound discharge is thin, with a fœtid odour. As the disease progresses, the pulse-rate increases out of all proportion to the temperature. The discharge becomes more fœtid. Crepitations are felt in the tissues and in the skin. The discoloration becomes more marked and is spreading. The discharge may become purulent if mixed infection be present. Pain becomes acute, and the temperature now rises rapidly. The patient is restless. These symptoms may increase in severity, and may extend from a few hours to three or four days. Septicæmia may then set in, with falling temperature and rising pulse-rate. The patient may linger for a while in a typhoid condition, or die suddenly from liberation of gas in the blood-stream.

For X-ray appearances caused by gas in the tissues (*see* p. 32 and *Plate I*).

The preventive treatment of gas gangrene is the same as is required

in all early gunshot wounds, i.e., thorough cleansing, 'débridement,' and removal of damaged tissue and foreign bodies, together with such methods of sterilization and drainage as may be preferred. Particular attention is given to the removal and prevention of all pressure, especially that arising from blood-extravasation. The evils of tourniquets and tight bandages are well recognized. When infection is established, Weinburg[35] advises a **Vaccine** prepared with all the organisms, aerobic and anaerobic, that are found in the wound to be treated. The mixture of organisms is prepared with iodine after the method of Ranque and Senery. Of this omnivalent iodized autovaccine, which can be prepared in from one to two hours, several injections are made daily or every two days. *Perfringens* serum has given favourable results. At the same time, energetic surgical measures are required. Incisions are made into the affected muscles, and in severe cases ablation of the whole muscle or group of muscles is practised when they show the 'red death' or brick-red colour. Amputation by the circular, flapless, or other rapid method is necessary when the main artery is blocked. **Hypochlorous Acid** has given much satisfaction when proper surgical attention has been rendered.

Fraser[36] makes the following observations on the features noted during treatment by **Eusol.** "During the first twenty-four hours the foul smell of the wound entirely disappears; the discharge as such also disappears, but is replaced by a lymph-like secretion, which soaks the dressings with a glairy, gelatinous-looking fluid. After the third day the lymph-like discharge tends to cease, granulation tissue begins to make its appearance, and slightly blood-stained serum escapes from the wound. Sloughs separate with extraordinary rapidity, and the healthy granulation tissue which remains completes the process of healing at a more rapid rate than I have previously observed." The local injection of hydrogen peroxide does not appear to have fulfilled expectations, and in some cases it has proved harmful. The treatment of acute toxæmia secondary to gas gangrene by intravenous injections of eusol (Fraser and Bates[37]) has been described in an earlier part of this article. The method continues to give satisfaction.

For the treatment of large granulating areas resulting from gunshot wounds, Bathe de Sandfort[38] has introduced a composition of paraffin and resin which is called **Ambrine.** When warmed it is painted on the wound, a film of cotton-wool is added, and more ambrine, until a firm compress is produced; this dressing is renewed every twenty-four hours. It is removed with ease, as it peels off 'like a glove.' It is claimed that it relieves pain and promotes rapid healing. (*See also* p. 20.)

REFERENCES.—[1]*Brit. Jour. Surg.* 1916, Jan., 451; [2]*Lancet*, 1915, ii, 638; *Brit. Med. Jour.* 1916, i, 793; [3]*Proc. Roy. Soc. Med.* 1915, Nov., 1; [4]*Rev. de Chir.* 1915, 289; [5]*Lancet*, 1916, i, 613; [6]*Presse Méd.* 1915, 425; [7]*Lancet*, 1916, i, 123; [8]*Proc. Roy. Soc. Med.* 1916, June, 8; [9]*Brit. Med. Jour.* 1916, i, 1; [10]*Lancet*, 1916, i, 1077; [11]*Brit. Med. Jour.* 1916, ii, 282; [12]*Presse Méd.* 1915, 377; [13]*Brit. Med. Jour.* 1916, i, 685; [14]*Lancet*, 1916, i, 356; [15]*Edin.*

Med. Jour. 1916, i, 100 ; [16]*Presse Méd.* 1915, 397 ; [17]*Brit. Med. Jour.* 1916, i, 126 ; [18]*Ibid.* 1915, ii, 504 ; [19]*Ibid.* 1916, i, 83 ; and ii, 172 ; [20]*Ibid.* 1915, ii, 921 ; [21]*Lancet*, 1916, i, 1119 ; [22]*Med. Press and Circ.* 1915, ii, 512 ; [23]*Brit. Med. Jour.* 1915, ii, 923 ; [24]*Lancet*, 1915, ii, 1398 ; [25]*Brit. Jour. Surg.* 1915, Oct., 276; [26]*Med. Press and Circ.* 1915, ii, 465; [27]*Lancet*, 1916, ii, 268 ; [28]*Pract.* 1916, ii, 196 ; [29]*Brit. Med. Jour.* 1916, i, 1 ; [30]*Presse Méd.* 1915, 89 ; [31]*Lancet*, 1916, i, 948 ; [32]*Brit. Med. Jour.* 1916, i, 77 ; [33]*Lancet*, 1916, i, 123 ; [34]*Brit. Med. Jour.* 1916, ii, 381 ; [35]*Glasgow Med. Jour.* 1916, i, 252 ; [36]*Brit. Med. Jour.* 1915, ii, 525 ; [37]*Ibid.* 1916, i, 83 ; and ii, 172 ; [38]*Lancet*, 1916, i, 1187.

HÆMATOCELE. *J. W. Thomson Walker, M.B., F.R.C.S.*

In an article on hæmatocele of the tunica vaginalis, Whitney[1] divides the condition into a primary form, where the blood effusion takes place in a normal tunica vaginalis, and a secondary, where the blood is mixed with the contents of other sacs, such as hydrocele or spermatocele. The most frequent form is the effusion of blood in a hydrocele, due to a fall or blow, to tapping, to syphilis, and, very rarely, to hæmophilia or scurvy. A very rare effect of hæmorrhage into a hydrocele sac is that the hydrocele is cured ; the author believes this is due to the irritation of blood-clot. The primary form is rare, because the result of a blow is usually to form a hæmaturia in the serotal tissues. In acute cases the diagnosis is easy, but there may be greater difficulty in chronic cases. There is then a firm, more elastic swelling, which is not translucent, not tender, and aspiration —from the blocking of the cannula with clots—does not produce fluid. The diagnosis lies between benign and malignant growths, syphilitic orchitis, tuberculosis, and certain forms of hernia, as well as hydrocele and certain extravaginal cysts.

Incision and removal of clotted blood is usually enough in primary cases ; but in those secondary to hydrocele the sac should be removed. In old-standing cases with thick walls and involvement of the testes, castration may be necessary. In operating on cases of apparently malignant disease of the testis, the possibility of hæmatocele should be remembered, and a small incision into the tumour is recommended before removing the testis.

Reference.—[1]*Boston Med. and Surg. Jour.* 1916, ii, 51.

HÆMOPHILIA. *Herbert French, M.D., F.R.C.P.*

Notwithstanding the danger that arises from any prick or cut in hæmophilic cases, the general consensus of opinion amongst those who have had experience in the treatment of severe instances of this disease is that the best results obtained have followed the use of **Serums.**[1] Various kinds have been administered, including rabbit, horse, and normal human serum. It has been used in different forms —freshly obtained from the blood in the form of plain horse serum, or weak preparations of diphtheritic antitoxin when other serum is not available ; also, solutions of the dried serum. Of late, controversy concerning serumtherapy has been confined mainly to the kind of serum producing the best results. All are agreed as to its value.

Serum may be administered intravenously, or subcutaneously, or applied locally to the bleeding point if it can be reached. For intravenous injection, from 10 to 20 c.c. can be given every day until the bleeding stops, whereas for subcutaneous injection this dose should be doubled. The intravenous injection has great advantage over other methods, probably because by mixing intimately with blood it supplies more rapidly those absent elements necessary to increase its coagulability. When given subcutaneously, the serum must first be absorbed into the blood-stream from the tissues, and before this can occur it will probably undergo a certain amount of change from action by the tissue-cells.

Normal human serum, if this can be obtained, is, without doubt, the best to use, since it contains no foreign proteins. Horse serum (or diphtheritic antitoxin) is the most convenient form, as it is readily obtainable. There must be borne in mind, however, the possibility of anaphylactic shock, which should be carefully considered before administration to those patients who have more or less recently received injections of antitoxin.

REFERENCE.—[1]*Jour. Amer. Med. Assoc.* 1916, i, 1700.

HÆMORRHAGE IN THE NEW-BORN,

Frederick Langmead. M.D., F.R.C.P.

A. R. Green[1] classifies *intracranial hæmorrhage in the newly-born* into two groups—infratentorial and supratentorial. In the former the symptoms and signs are primarily respiratory in character, and are probably dependent on pressure on the respiratory centre ; in the latter they are primarily convulsive, due to irritation of the cerebral cortex. In case of doubt, diagnosis should be confirmed by lumbar or cerebral puncture, or both. In the infratentorial form repeated **Lumbar Puncture** is probably the best palliative treatment, and may prove curative. In the supratentorial form **Incision** along the coronal suture, at one or both angles of the anterior fontanelle, followed by brief drainage, should be employed, more extensive procedures being unnecessary and likely to prove fatal. Early diagnosis, and operation within the first two or three days of life before clotting becomes considerable, are essential if good results are to be obtained.

Tallant[2] records a case of *hæmorrhagic disease* where recovery followed the injection of **Coagulose.** Two-thirds of an ampoule were administered on the second day of the disease, and the remaining third next day.

REFERENCES.—[1]*Boston Med. and Surg. Jour.* 1916, i, 947 ; [2]*Woman's Med. Jour.* 1915, Dec. (*Ther. Gaz.* 1916, i, 338).

HÆMORRHOIDS. (*See* RECTUM, SURGERY OF.)

HAIR DYES, (*See* DERMATITIS, TOXIC.)

HAIRS, REMOVAL OF. (*See* p. 56.)

HAND, INFECTIONS OF. *W. I. de C. Wheeler, F.R.C.S.I.*

From an economic standpoint, infections of the fingers and hands require careful surgical attention, as they cause a high percentage of disability, and frequent amputations are necessitated. The causative injury is generally trivial, such as pin-pricks, small cuts, cracked hands, etc. On the other hand, it is noteworthy that extensive lacerations (perhaps owing to early treatment) seldom become early infected. Mock[1] deals exhaustively with this subject from a study of 1600 cases. For prevention he urges the use of **Tincture of Iodine** in every industry for minor injuries of the hands and fingers. Active treatment he considers should be undertaken in a radical form when the infection shows signs of becoming at all serious. Operations should be undertaken in hospital under a general anæsthetic. Statistics go to show that the results are far better than if the patients are treated in the extern department.

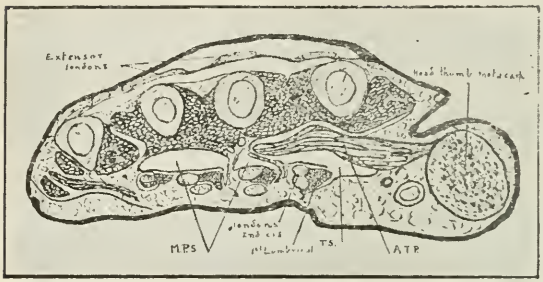


Fig. 51.

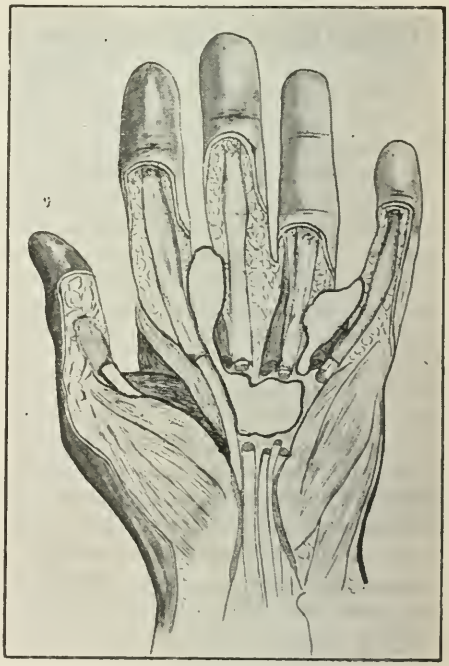


Fig. 52.

McConnell,[2] Dublin, points out the totally inadequate attention given to infections of the hand in text-books, and the dangers of the usual incisions for the evacuation of pus in the hand. He had repeated and confirmed Kanavel's work on the anatomy of the hand, which had demonstrated the presence of a definite space in relationship to the metacarpal bones

PLATE XXVI.

INFECTIONS OF THE HAND

Fig. A.

Fig. B.

of the middle and ring fingers lying deeply between the flexor tendons and the interosseous muscles—the middle palmar space (M.P.S., *Fig.* 51). *Plate XXVI, Fig. A*, shows the middle palmar space injected with red lead, and demonstrates one of its prolongations along the lumbrical muscle of the ring finger. *Fig.* 52 shows a dissection of a hand in which this space had been injected. The presence of the thenar space of Kanavel in front of the adductor transversus muscle and its prolongation along the lumbrical muscle of the index finger is shown in *Fig.* 51, T.S., and in *Plate XXVI, Fig B*. The writer had treated many cases of pus in the middle palmar space by Kanavel's incisions along the lines of the lumbrical muscles of the middle, ring, and little fingers; but he had found that such cases could be treated efficiently by an incision placed *behind* the web of these fingers, and by the introduction of a drainage tube into the space along the lumbrical tunnel. *Fig.* 53 shows the anatomy of this approach, and demonstrates that the digital vessels and nerves are not divided, so that the danger of secondary hæmorrhage and of the involvement of nerves in scar tissue is diminished. Pus in the thenar space was evacuated by Kanavel's incision along the radial side of the index metacarpal bone, and by the introduction of a forceps in front of the adductor transversus pollicis. The writer points out the importance of distinguishing between infection of the tendon sheaths and that of the fascial spaces.

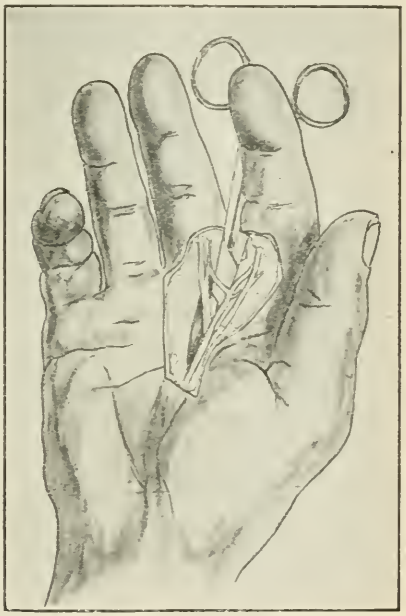


Fig. 53.

References.—[1]*Surg. Gyn. and Obst.* 1915, ii, 481; [2]*Trans. Roy. Acad. Med. Ireland*, 1913, 156.

HAY FEVER. *J. S. Fraser, M.B., F.R.C.S.*

Wilson[1] states that the symptoms of hay fever are: (1) *Characteristic*—(*a*) Itching, redness and swelling of the skin or mucous membranes of the body, throat, nose, eyes, etc.; (*b*) Sneezing, lachrymation, rhinorrhœa; (*c*) Asthma. (2) *Miscellaneous*—(*a*) Fever, malaise, asthenia; (*b*) Vomiting, diarrhœa, cardiac disturbances, swelling of lymph-nodes.

There are more than fifty plants to the pollen of which hay-fever subjects are sensitive. To this we may add many fruits, such as strawberries, raspberries, pears, bananas, etc.; vegetables, such as tomatoes, celery, spinach; lobsters, crabs, oysters; eggs, milk, various meats, etc. All these substances contain special protein bodies. This protein is the active agent in causing the symptoms in question. The same symptom-complex may be caused by substances which contain no protein whatever, such as quinine, iodine, ipecacuanha, and salol. The vasomotor mechanism concerned in the production of the sensitization-syndrome may be set in operation in more than one manner. Physiological chemistry is at the bottom of the whole series of phenomena. Sensitization appears to be closely related to what we know as anaphylaxis, and to alterations in the relations of the endocrine glands.

Preparation of the Pollen Vaccine.—Having ground a weighed portion of the dried pollen in an agate mortar with a small amount of water or saline solution, more salt solution is added, and the whole incubated for twenty-four hours. The mixture is centrifugalized, and the clear supernatant fluid used as a basis for subsequent dilutions. The term 'pollen-unit' means the soluble protein contained in 0·000,001 grm. of dried pollen. As regards dosage, it is quite safe to begin with one or two units. In many cases considerably more than 1000 units may be safely given after a sufficiently extended preliminary desensitization. Injections should be given at intervals of three to five days.

Wilson states that of eleven patients treated in 1914 with pollen solutions, none were absolutely relieved, and only two could be said to have shown 'marked improvement.' Of ten patients treated with pollen solutions in 1915, one (her second year of treatment) had absolute relief, and one marked improvement. These results are not as brilliant as those reported by other writers, probably because Wilson is unable to accept anything short of marked relief from hay-fever symptoms as definitely due to treatment, and even this degree of improvement, if it is more or less transitory, may arise from other causes. Multiple sensitization is a frequent phenomenon in hay-fever subjects, and its existence may account for many failures in the treatment by means of pollen solutions.

The treatment with **Calcium Chloride** has been more satisfactory than that with pollen solutions. There seem to be no definite contra-indications to the daily ingestion of 3 to 6 grms. Anyone taking one or two pints of milk daily will get as much calcium.

Oppenheimer and Gottlieb[2] wish to substitute the term 'pollinosis,' or pollen disease, for hay fever. It is a disease of the classes rather than the masses. Heredity plays a very important rôle in its etiology. Over 90 per cent of patients have other members of their family who suffer with allied ailments such as urticaria, asthma, or other manifestations of anaphylaxis, following the ingestion of casein, egg-white, or shell-fish, or are sensitive to pollen or to dust, or the serum of horses and cats. The nasal factor should not be considered

as too important; many patients have had considerable surgical treatment of the nose, and it has been in but the rarest instances that benefit has resulted. Marked stenosis or suppurative processes in the accessory nasal cavities should be corrected. It is desirable to have as large a working collection of pollens as possible.

Three methods may be employed for determining to which pollen a patient is anaphylactic—the ocular, the hypodermic, or the cutaneous method. Oppenheimer and Gottlieb now use the last. A very small scratch, not enough to produce bleeding, is made on the arm, and a very minute quantity of pure pollen is gently rubbed in. In a few minutes a wheal will develop around it. The swelling and redness are measured after fifteen minutes. Similar vaccinations are made during the course of treatment, so as to determine whether the size of the wheal diminishes as immunization progresses.

Attacks may begin in the early part of April. The latest the authors have known patients to suffer is the latter part of October. In order to judge when treatment should be stopped, they have used the complement-fixation test of the patient's blood, with an antigen of the pollen which gives the most intense reaction. Patients suffering from pollinosis, especially those who breathe through the mouth, inhale into their bronchial tubes large quantities of pollen which cause a swelling of the mucous membranes, with the production of typical asthma. Asthmatic symptoms are perpetuated throughout the year owing to secondary bacterial infection, and are followed by the usual cardiac dilatation.

Oppenheimer and Gottlieb recognize two immunization methods, active and passive. Active immunization treatment, by increasing doses of pollen extract, should be commenced about eight or ten weeks before the expected onset of symptoms. Injections are given about every four to six days. If a patient is susceptible to more than one pollen, an individual injection of each is given, according to the reaction produced by the previous injection. Thus some patients get five or six hypodermic injections at each treatment. In passive immunization, patients not able to develop for themselves enough immune body, have one large dose of blood serum administered from a rabbit that has had large quantities of pollen extract injected at regular intervals for about five months. Only one dose is given, and anaphylaxis is thus avoided. In spring cases there were 50 per cent of seasonal cures. In autumn cases, out of 52, 15 were definitely free from symptoms, 25 were markedly improved, and 12 in no way modified. (*See also* **Vaccines** p. 29.)

References.—[1]*Laryngoscope*, 1916, June; [2]*Med. Rec.* 1916, i, 705.

HEAD, GUNSHOT WOUNDS OF. (*See* Brain and Skull.)

HEADACHE. *Herbert French, M.D., F.R.C.P.*

Edsall[1] emphasizes the frightful misuse of drugs in the treatment of such common complaints as headache, insomnia, and constipation. In regard to headache it is important, whenever possible, to discover

the underlying cause, and treat this rather than the headache itself. The following are among the more definite and easily accessible conditions giving rise to headache :—

1. *Organic Brain Disease.*—To be thought of particularly if the headache is comparatively recent, severe, and persistent in a patient not previously subject to such pain, and especially if there is vomiting or disturbance of gait ; optic neuritis will be the final criterion.

2. *Eyes.*—Always learn whether eyes have been recently and properly examined.

3. *Local Lesions in the nose, sinuses, or teeth* may give rise to headaches,

4. *Nephritis.*—Blood-pressure, urine, eye trouble, and circulatory condition should be sufficient ground for diagnosis ; but at times it is difficult to determine that nephritis is absent.

5. *Acute Infections.*—These need to be thought of in recent cases. Typhoid fever in particular may be present for ten days with no other symptoms than a dull persistent headache and some malaise. Syphilis, of course, often causes headache.

6. *Toxic.*—Acute and chronic alcoholism. Excessive tobacco, tea, or coffee. Tea is apt to be drunk to excess by maids and cooks. Various industrial poisons, especially lead. Naphtha and nitro compounds. The latter, used especially in manufacture of explosives, sometimes causes both temporary and persistent headaches. English soldiers in the Boer War indulged in nitroglycerin and dynamite drunks, which were followed by severe headaches.

Other forms of headache whose etiology is less easily understood, though they are so common, are :—

1. *Migraine.*—The characteristic hereditary, ocular, spasmodic, and hemicranial features are of value in its recognition. It is often easy to benefit migraine, because it is usually increased by the other accessible causes of headache, but it is hard to treat migraine really successfully.

2. *Headaches due to habits of body or to local conditions* of indefinite character.

a. Fatigue, especially mental. Treatment is directed to the fatigue.

b. Emotional and psychoneurotic.

c. Lack of exercise. The average subject of headache notices that he has less headache in summer than winter. Migrainous headaches are no exceptions to this rule. The importance of exercise must not be forgotten.

d. A large proportion of patients in this class are under-nourished, often not because of actual disturbance of digestion, but rather simply as the result of habit. Their diet has been small in amount and limited in type of food. Caution must be exercised in increasing the quantity and the variety. Open air is of great value.

e. Local focalized infections, especially in the mouth or nose, may be a source of headache.

f. Actual indigestion. The indigestion is more apt to be intestinal

than gastric. Carbohydrates are a comparatively common cause of intestinal indigestion. This is detected by gas-forming stools and excess gas-formation in the intestines, and often excess in the use of these foods. Modify the carbohydrate intake in such forms. Protein excess is sometimes the cause ; here exceptionally foul stools are often found. Make thorough examination of fæces in all cases. Constipation alone undoubtedly produces headaches, but usually by means of the accompanying disturbance of the digestion (intestinal fermentation and putrefaction). Often laxatives keep the bowels so irritated that headache follows ; if the patient is taken off the laxatives, the headache stops.

g. Persons who have low blood-pressure and poor peripheral circulation often have headaches. The treatment here is **Warm Baths,** with **Cold Douches** and thorough **Friction.** Blood-pressure may often thus be raised and the headaches removed thereby.

The Use of Drugs in the Treatment of Headache.—No headache drugs are free from a permanent depressant effect in the long run. Many very sensible patients refuse drugs on this basis ; but unquestionably drugs must be employed at times, though the treatment should rarely if ever be purely palliative. The following suggestions are of value in the treatment of an attack of headache : Complete rest and quiet, with hot or cold applications. Laxative, preferably a **Saline** at onset. Aspirin is of value in mild attacks. **Acetphenetidin** 5 gr., repeated in two or three hours, sometimes accompanied by the **Bromides,** controls ordinary suffering. **Antipyrin** with sodium bicarbonate may be of value. **Cannabis Indica,** 2 to 5 drops of the fluid extract, is worth trying in migraine, though it frequently varies in potency, and is very uncertain in effect. **Leeches,** applied to the forehead, may give remarkable results in violent headaches, especially those accompanying acute infections. The case must be very rare which requires opiates. Discourage absolutely the use of any analgesic drugs except at times when the suffering is severe enough to demand it.

Reference.—[1]*Boston Med. and Surg. Jour.* 1916, i, 284.

HEART, DISEASES OF. (*See also* Angina Pectoris : Pericarditis ; Soldier's Heart ; Syphilis, Cardiac.)

Carey Coombs, M.D., M.R.C.P.

Etiology.—To this aspect of heart disease more and more attention is rightly being directed. Only by a more complete comprehension of the causes of heart disease can we hope to make progress in its prevention and treatment. Take for example the cardioscleroses of middle life. Aikman[1] asks to what the increasing incidence of these lesions can be due : may not *tobacco* be a factor ? He thinks that the slight circulatory disturbances (pulse quickening being the chief feature of his own experiments) which follow a small dose of tobacco, if often repeated over years, may be capable of establishing permanent lesions. But experiments by Pozzi and others[2] show that such disturbances of the heart's action as do follow nicotine poisoning are

vagal and supraeardiae in origin, and purely transitory. So the matter remains undecided.

Another toxæmia that certainly does produce permanent cardiac lesions is *hyperthyroidism*. This is apparently (Fahr[3]) due to the direct effect of the poison on the heart muscle. Opinions differ as to the extent to which the damage done can be detected histologically, but the presence of lesions is well established. Often the injury thus inflicted persists long after the causal thyroid lesion has disappeared.

The possibilities of *vagus influence* in the production of pulse irregularities are illustrated by a paper by Sicard and Meara,[4] who record cases of (1) Sinus block (standstill of the heart) by vagus stimulation under the influence of sodium salicylate; (2) Increased heart action with sinus arrhythmia, controlled by pressure on the right vagus; (3) Paroxysmal tachycardia controlled by vagus pressure. Similarly Ferralis and Pezzi,[5] writing on the oculocardiac reflex, show that compression of the eye, which is a form of vagus excitation, can promote the occurrence of extrasystoles, either singly or in series.

Diagnosis.—The presence of an auriculo-systolic liver pulse—of form similar to the jugular curve—as established by graphic records, has been claimed as evidence of tricuspid stenosis. That this is not so is shown by Pezzi,[6] who has observed similar tracings in several cases of congenital anomaly of the right side of the heart. He adds, however, that the presence of a well-marked auriculo-systolic wave in the liver pulse-curve in a case of mitral disease justifies a suspicion of the co-existence of tricuspid stenosis.

The place of *electrocardiography* in diagnosis is very fully discussed by Krumbhaar,[7] who claims for it a chief place in the analysis of arrhythmias. Not only so, but in his opinion it furnishes accurate evidence of the relative size of the different chambers of the heart. He very properly qualifies his otherwise enthusiastic praise by stating that "it is at the best but one of several aids to the discriminating physician." (*See also* Electro Therapeutic Section, p. 42).

Prognosis.—The trend of modern cardiology towards a true etiological basis for our knowledge of heart disease is well illustrated in an article by Witt.[8] He points out that most cases of heart disease fall within one of four groups: the inflammatory or rheumatic group, the syphilitic, the renal, and the arteriosclerotic. In other conditions the heart is affected, as for instance in hyperthyroidism, but in such cases it is for the most part in the background of the picture. In the first or rheumatic group, the heart is attacked by an infection which (1) involves all its various structures; (2) tends to recurrences, each of which adds to the permanent invalidation of the cardiac functions. The danger lies in these reinfections of a heart already damaged; even if they do not cut life off at once, they leave the heart permanently and irremediably injured. Avoidance of reinfection is therefore the desideratum. Witt thinks removal of tonsils and adenoids the most promising measure in this direction. The prognosis in these cases depends wholly on the extent to which the patient is saturated with

the rheumatic infection. As for the syphilitic cases, the same holds good, and here it is important to make the diagnosis early, while treatment has still some chance of preventing injury to delicate tissues that cannot be regenerated. This chance, it must be confessed, is small even in the most favourable cases. In the arteriosclerotic group one of the most difficult tasks from the prognostic aspect is to separate out such added factors as recent influenzal infection, alcoholism, and so on. When the arteriosclerotic factor is uncomplicated, the prognosis largely depends on the possibility of cutting out some at least of the overstress which is probably at the root of it. If no such stress is traceable, there is little that can be done to alleviate the condition, and the outlook is gloomy. It is the more so if there is pain and it is easily provoked, also if the arterial pressure is high. In the nephritic cases it may be said that to a prognosis already bad enough by reason of the renal lesion, is added the burden of a hopeless and progressive cardiac breakdown. An interesting study of the same problem from a different angle is contributed by White,[9] who shows that some types of arrhythmia are more apt to arise in the rheumatic, others in the arteriosclerotic, syphilitic, and renal cases respectively. The principal form of irregularity in the rheumatic cases is the total arrhythmia that is associated with auricular fibrillation.

Treatment.—Potter's[10] remarks on dieting in the treatment of cardiac insufficiency resolve themselves mainly into an account of the **Karell Milk Cure.** In its original form this consisted exclusively of skimmed milk in amounts of two to six ounces at exact intervals three or four times a day, and swallowed slowly. The amount was gradually increased, the whole cure lasting five or six weeks. Constipation often occurred, and was relieved by a simple enema or some aperient; if obstinate, coffee and fruit (apples or prunes) were added to the diet. For thirst, plain water was added. If the desire for solid food became overpowering, Karell allowed a little bread and salt, or salt herring, in the second or third week. Absolute rest in bed is necessary with so strict a régime. Potter finds the diet equally valuable if certain relaxations are permitted, as follows: (1) Full milk (unskimmed); (2) Strengthening full milk still further by adding cream, but without increasing the bulk; (3) Adding lactose in gradually increasing amounts; (4) Adding unsalted and very thoroughly boiled oatmeal in gradually increasing amounts, either to the milk itself as a gruel, or as a cereal upon which the milk with or without lactose is poured. Not only does this render the cure more tolerable, but it makes the transition to a normal diet less sudden, and also makes it possible to return to short courses of the cure from time to time. The treatment is specially indicated in the various forms of primary myocardial disease with decompensation.

White[9] also finds diet a useful adjunct to treatment in chronic heart disease. He gives the patient five small meals daily. The form of **Digitalis** which he favours is a pill of standardized leaves, intravenous medication being but seldom indicated. To nearly half of his

patients with cardiac decompensation he gave **Morphia,** and found it valuable in restoring the power to sleep. **Venesection** was useful in a few urgent cases. (*See also* p. 30.)

From time to time papers appear in support of Abrams' claim that the size of the dilated heart and aorta can be reduced reflexly by **Stimulation over the Seventh Cervical Vertebra.** M. Solis-Cohen[11] is the latest advocate of this curious method. He describes the plan thus: "In provoking the reflex, a plexímeter (which may consist of a rubber eraser or a piece of soft rubber or linoleum about six inches long, one and a half inches wide, and about a quarter of an inch thick) is placed over the spinous process of the seventh cervical vertebra, and given a series of sharp and vigorous blows with a plessor having a large piece of thick rubber, or with an ordinary hammer with a rubber tip, or with a jeweller's hammer. In an emergency the palmar surfaces of the fingers of one hand can be applied to the spine, while the dorsal surfaces of those fingers are struck with the clenched fist of the other hand. This normally is followed by a contraction of the heart and aorta," which is said to persist for several days. The evidence in favour of this statement consists of comparative estimations of the cardiac dullness before and after the percussion. The method was employed in conjunction with other remedies in all kinds of cardiac disease. In particular he mentions "rest and application of a hot-water bag to the precordia for three minutes, immediately followed by the application of an ice-bag to the precordia for twenty to forty minutes."

Seymour Taylor[12] reiterates the advice which he has previously given, that no patient with *aortic regurgitation* should be treated with digitalis. He gives notes from his experience of patients with this lesion, for whom the drug was suggested, but withheld at his advice, who have attained a good age. Conversely he speaks of cases of sudden death following on the use of the drug.

Bishop,[13] writing of *auricular flutter*, advocates the following methods, in addition to the use of digitalis (which, as is well known, reduces the flutter to fibrillation before the normal rhythm is finally restored). (1) Full doses of castor oil according to the plan of the following prescription :—

R	Tincture of Iodine	℥lxxx	Castor Oil	℥viij
	Menthol	gr. xvi		

Two tablespoonfuls June 22, 29, July 1, 7, 21, August 11, September 8, and once each month thereafter.

(2) This is supplemented by graduated out-of-door exercise. The patient walks as much as he can without distress, beginning with a short distance and gradually increasing it; (3) Eggs, fish, meat, and stock soups are excluded from the diet. Apparently, from the context, this is limited to the cardiosclerotic type of case. But it is not in these alone, or specially, that flutter is observed. Neuhof,[14] for instance, describes a case of rheumatic carditis with auricular flutter,

in which, as he justly remarks, the obvious line of treatment is to attack the infection which has given rise to the disturbance of rhythm as well as to the other features of the case. [In this we have an instance of the statement at the head of the present article, that the only satisfactory basis for treatment of cardiac disease is etiological diagnosis, i.e., a complete comprehension of the cause of the lesion and the *modus operandi* of the same.—C. C.]

The influence of *pregnancy and labour* on cardiac disease is always a vexed question. Huntington[15] quotes appreciatively the following excellent advice by Newell, in connection with the problem of how to advise the mitral patient about to marry.

"Therefore, in giving advice to the individual patient, the factors present in her case must be carefully considered, irrespective of what the general statistics show. If a patient, although she has a definite valvular lesion, has never had a failure in compensation ; if she is at an age at which her powers of recuperation can be counted on to restore a possible break in compensation ; and if she understands the importance of taking care of herself during pregnancy, and can be under careful observation, such a patient may fairly elect to run the risks of pregnancy, if the satisfaction of having children outweighs in her mind the possibility of death, the inevitable shortening of her life, and a possibile invalidism following the pregnancy ; but it is not fair to advise her to have children unless she fully understands the risks involved."

Huntington continues by examining the case of a patient with a history of one or two serious breaks in compensation who comes to us for advice in the early months of pregnancy. He says : "The patient should be plainly told of the risk she is running, and be given the alternative of having the pregnancy interrupted or taking a fighting chance. Should the patient have no history of breaks in compensation, should she appear in good physical condition, and if her heart presents a double lesion, she should be told that she is running a definite risk, but should also be told that her chances are at least as good as even. However, should the patient have all these favourable signs and evidently be anxious for a child, and present a single lesion —even if mitral stenosis—he is inclined to be optimistic and dwell on the encouraging side of the picture, taking the precaution, however, to point out to her husband that there was a perfectly definite risk involved. His reason for this course would be that, as optimism is such an asset in any pregnancy, it would be unwise not to allow the patient that added chance for a successful outcome. On the other hand, when the patient is considering whether or not it is wise to become pregnant, or particularly when a mother of one or more children asks for advice in this regard, whether or not she gives a history of breaks in compensation, the risk should be clearly pointed out to the patient herself."

Finally, he says that "where the cardiac condition requires that the uterus must be emptied several weeks before term, vaginal

hysterotomy, when not rendered impossible by the anatomical limitations, offers distinct advantages over abdominal Cæsarean section, particularly because in the former operation there is no post-operative distention."

References.—[1]*N.Y. Med. Jour.* 1915, ii, 891 : [2]Quoted in *Jour. Med. Amer. Med. Assoc.* 1915, ii, 1819 ; [3]*Centralbl. f. Pathol.* 1916, xxvii, 1 ; [4]*Amer. Jour. Med. Sci.* 1915, ii, 843 ; [5]*Policlinico (Sez. Med.)*, 1916, 149 ; [6]*Ibid.* 129 ; [7]*N.Y. Med. Jour.* 1916, i, 541 ; [8]*Med. Press and Circ.* 1915, ii, 344 ; [9]*Boston Med. and Surg. Jour.* 1915, ii, 851 ; [10]*N.Y. Med. Jour.* 1916, i, 450 ; [11]*Ibid.* 1915, ii, 787 ; [12]*Lancet*, 1916, ii, 96 ; [13]*N.Y. Med. Jour.* 1916, i, 937 ; [14]*Med. Rec.* 1915, ii, 995 ; [15]*Boston Med. and Surg. Jour.* 1916, i, 236.

HEMIPLEGIA. (*See also* Cerebral Hæmorrhage ; Cerebral Paralysis, Transient.)

HERNIA. *E. Wyllys Andrews, M.D., F.A.C.S. (Chicago).*

Turner, of Philadelphia, presents a study of six unusual types of inguinal hernia and an anatomical study of femoral hernia. Of these, cystocele, or sliding hernia of the bladder, was noticed in one case. Also, sliding hernia of the colon without the presence of a sac, and the concurrent appearance of inguinal and femoral hernia, in one case. Hernias of the bladder usually present a prevesical lipoma, not presenting at the hernial ring, but the bladder may protrude through the ring and even be subject to strangulation. The occurrence of hæmaturia or anuria helps in the diagnosis of these cases. Femoral hernia, in this writer's opinion, is still poorly understood from the anatomical standpoint. He presents a series of photographs of dissection in this condition, illustrating some new points in the anatomy. On account of the small rings in femoral hernia, protrusion of part of an intestine, or Littré's hernia, is not uncommon. Ackerman reported 116 cases in a total of 664 gangrenous hernias. He concludes that the problem of radical cure of femoral hernia is that of closing the ring, as in umbilical hernia, and not that of closing a canal as in inguinal hernia.

Balfour reports a case of non-strangulated diaphragmatic hernia. Like most such cases in adult life, this was produced by a crushing injury. The patient remained subject to intermittent bowel obstruction, and there were splashing sounds of fluid and air in the left thorax. *X*-ray examination showed the stomach and some intestine in the left thoracic cavity. At operation, the wound in the diaphragm was closed successfully, and recovery followed.

Jacobson reports experiences with local anæsthesia in herniotomy. With half per cent novocain in adrenalin he has never had any toxic effects, and found no difficulty in completing routine operations.

References.—*Amer. Jour. Obst.* 1915, Nov. ; *Surg. Gyn. and Obst.* 1915, ii, 770.

HERNIA CEREBRI. (*See* Brain and Skull, Gunshot Wounds of.)

HERPES RECURRENS. *E. Graham Little, M.D., F.R.C.P.*

Adamson[1] discusses the etiology of herpes febrilis and its association with the specific fevers, and quotes some statistics compiled by J. D. Rolleston, from which it would appear that the association is commonest with lobar pneumonia, cerebrospinal fever, and malaria, and least frequent in small-pox; in the latter disease only twice in 2000 cases. It is also rare in typhoid fever, as was observed by the older physicians. This author would regard the infrequent cases recorded of specific bacteria being found in the vesicles, e.g., diphtheria bacilli in a case associated with diphtheria, as accidental contaminations.

The eruption may recur several times in precisely the same area, and in facial herpes the left cheek is more often affected than the right. The first attack usually comes in early childhood, at the age of three or four, and the intervals between the recurrences, perhaps indefinitely repeated, may be from a month to a year. Gluteal herpes, which seems to affect much older persons, was regarded by Dubreuilh as symptomatic of gout, a view with which Adamson does not agree. He notes that in all cases of recurrent herpes in an unusual situation apparently beginning in adult life, he has been able to get a history of juvenile herpes labialis.

Treatment.—This should include the removal of any source of reflex irritation, such as adenoids, dental troubles, eyesight defects, intestinal worms, etc. A dose of **Quinine**, 2 to 5 gr., at the beginning of an attack, may apparently sometimes abort it. Local application of **Collodion** to the vesicles before they have burst, and of **Calamine Lotion** after bursting, may be recommended.

Reference.—[1]*Brit. Jour. Child. Dis.* 1916, 193.

HODGKIN'S DISEASE. *Herbert French, M.D., F.R.C.P.*

Although it is not accepted generally that the bacillus of Fraenkel and Much is actually the cause of Hodgkin's disease, reports are accumulating upon cases in which this micro-organism is recovered from the interior of lymphatic glands removed during life from patients suffering from this disease. Mellon[1] records an instance investigated by himself, and his original paper should be consulted for the full bacteriological details. He hoped to benefit his patient by using a vaccine prepared from the organism he recovered; but in reporting the bacterial findings he states that from a treatment point of view his vaccine was of no use.

Cunningham[2] has analyzed the clinical and pathological features of twenty-five cases, and his paper contains several characteristic temperature charts. He does not consider that the *Bacillus hodgkini* of Negri and Miermet has been established as the causal organism, but he does hold that the malady is not neoplastic but due to an infection —bacterial or protozoal—on the following grounds: (1) The histology is that of an inflammatory reaction: (2) Injections of gland emulsions cause lymphatic enlargement in animals; (3) The fever of the disease

closely resembles that of other infections; (4) There is often considerable leucocytosis; (5) The exudate that results when serous membranes are involved is of inflammatory type.

In regard to the total and differential leucocyte count, he finds great variations and nothing pathognomonic; but he brings out the fact that leucopenia is exceptional, that moderate leucocytosis is the rule, that considerable leucocytosis—up to 60,000 or more for instance—is common, and that the polymorphonuclear cells often reach a high figure—80 per cent or more—in the differential count.

In respect to the histological characters of the glands themselves, he concludes that, although large-celled hyperplasia, often with characteristic Dorothy Reed cells (a type of gaint cell), is a marked feature in many cases, the absence of these does not exclude a diagnosis of Hodgkin's disease; he holds rather that it depends on the *stage* of the glandular infection what histological appearances will be seen; and although these may merge into one another imperceptibly in the same gland, the following four distinct stages occur: (1) Hyperplasia of the lymphoid elements; (2) Hyperplasia of endothelial elements, with giant-cell formation and diminution in the lymphoid nodules; (3) The formation of much immature cellular fibrous tissue, with loss of the original architecture of the gland; (4) Mature fibrosis, with disappearance of lymphoid tissue, and masking of all normal glandular structure.

To diagnose Hodgkin's disease from a single section may be easy: but to exclude from one section may be very difficult.

References.—[1]*Amer. Jour. Med. Sci.* 1915, ii, 245; [2]*Ibid.* 808.

HOOKWORM DISEASE. (*See* Ankylostomiasis.)

IMPETIGO CONTAGIOSA. (*See* Skin, Pyogenic Infections of.)

INFANT FEEDING. *Frederick Langmead, M.D., F.R.C.P.*

Breast Feeding.—There is a popular opinion that women are becoming less and less able to feed their babies adequately at the breast, and that artificial feeding is increasing. Holt lends his authority to this view when he says, "In spite of all effort to the contrary, it is nevertheless a fact that the capacity for maternal nursing is steadily diminishing in this country" (U.S.A.). Many will agree with Griffiths, also an American physician, that the ability to nurse is no longer materially diminishing, but that the conditions which favour breast feeding are improving in the upper classes and are not changing for the worse in the poorer.

A. Graeme Mitchell[1] has collected some interesting statistics bearing on this point. A few examples will suffice. Pistor in 1914 found that of 12,809 babies born at Freiburg, 24 per cent were not breast-fed at all. Bluhm, after reviewing the German literature on the subject, concluded that a third of German women nursed sufficiently, somewhat more than a third were physically unable to nurse, and

less than a third nursed insufficiently or not at all, from deficiency of intelligence or desire, or because of social conditions. Such figures seem incredible to us. In this country, Blacker found that of 1000 poor babies, only 2·4 per cent never received breast milk, whilst 74·7 per cent were breast-fed for seven months or longer. No statistics for English babies of the better-off classes are quoted. In the United States, Koplik found that of 1000 infants seen in private practice, 56 per cent were breast-fed, and of these only 40 per cent for longer than four months. Snider compares 500 poor mothers living in tenement dwellings with 500 others who were prosperous and lived in healthy surroundings. Ninety per cent of the former, but only 16 per cent of the latter, nursed their babies for nine months.

With a view of determining as far as possible the ability of the mother to nurse, Mitchell has analyzed 2819 cases from the Children's Hospital, Philadelphia, for 1900–14. These showed that there had been no decline in breast feeding. The women of the poorer classes compared favourably, as to the period of lactation, with their more prosperous sisters. The average period of lactation in the children entered at the hospital was six months. Twenty per cent of the women did not nurse their children ; 80 per cent nursed for one week or longer ; 55 per cent for three months or longer ; 42 per cent for six months or longer ; 34 per cent for nine months or longer : 27 per cent for a year or longer ; 9 per cent for eighteen months or longer, and 2 per cent nursed for two years. As Mitchell observes, the figures given necessarily represent the minimal powers of lactation. It is believed by many in this country that with willing mothers who receive suitable encouragement and advice, both before and after the birth of their children, the number who cannot feed them at the breast is very small.

Concerning the prevention and management of deficient lactation, N. S. Heaney[2] gives some useful advice. The flow of milk into the breast, he says, always occurs, but it soon lessens and ultimately ceases if the breasts are not emptied either by the baby or artificially. Herein lies the source of many cases of deficient lactation. Some babies, apparently normal and well-developed at birth, make no effort to suck, or suck but little and then fall asleep. Such babies should be kept awake and stimulated to suck. If they do not respond, the milk must be drawn off by a breast pump. They must be given plenty of water. If in spite of these measures the infant continues to lose weight, artificial feeding becomes necessary, but often need only be temporary, for when he becomes satisfied he becomes less lethargic, and may then take the breast efficiently.

When a normal baby does not gain weight at the breast, he recommends the use of test feeds, the baby being weighed before and after each feed to determine the amount it receives. After the child is removed from the breast, the gland is emptied to see if residual milk is present. During this process it should be noted whether the milk escapes readily in several streams, or only with difficulty through

but one or two ducts, for in the latter case the child becomes exhausted before it has obtained a sufficiency. If it issues freely the child is apathetic. In all cases in which there is residual milk in the breasts they should be thoroughly emptied, or secretion will fail. Even when the breast secretion is at fault, the most efficient lactagogue is stimulation of the breasts by regular withdrawal of the milk in them.

When these observations show that lactation is really deficient, and that loss of weight is not due to the failure of the child to empty the breasts, the effect of emotion on the breasts has to be considered, and its causes removed if possible. The physical condition of the patient must also be taken into account, and her general health improved. A milk analysis is of no value, but an estimation of the amount of milk taken by the baby at each meal is very useful, and gives an indication of the amount of supplementary food which may be necessary. Not too much supplementary food must be given, or the baby will not empty the breast, and its activity will diminish. An artificial feed should not be substituted for a breast feed in early cases of deficient lactation, for by this means the intervals between stimulations of the breast by suckling are too long. The amounts received from the breast should be estimated frequently, so that the supplementary feeds may be lessened gradually as the breast becomes more competent. In this way they may often be abandoned after a short time. As an additional method of stimulating the breast, Heaney has found passive hyperæmia by means of Bier's pump, applied for periods of fifteen minutes, very useful.

Artificial Feeding.—F. J. Poynton,[3] to whose paper (see MEDICAL ANNUAL, 1905, p. 330) we owe the prevalent use of **Citrated Milk** in infant feeding, has written again on the subject. In his view it is a method for (1) Weaning healthy infants: (2) Increasing the amount of milk taken in twenty-four hours; (3) Correcting milk dyspepsia; and (4) The avoidance of scurvy. He disapproves of giving it to infants in the early days of life, considering that it introduces an unnecessary risk. The child's reaction to milk should first be tested with diluted milk, and then the strength of milk can be rapidly increased. Citrate of soda in infant feeding is very useful, especially in dealing with the poor, for it is cheap and handy, but its routine and prolonged use are not advisable. He upholds his modification of Sir A. Wright's method, adding 1 gr. of citrate of soda to the ounce of milk instead of 2 gr. advocated by its originator, and attempts to diminish the citration still further by the time the infant is taking 2 parts of milk to 1 part of water. The use of very dilute milk with large quantities of citrate may result in general anasarca and convulsions. Contrary to some writers, he believes that citrated milk is liable to cause constipation. The method is not always successful, nor is it a mere substitute for sodium bicarbonate as some suppose.

A. E. Mueklow[4] has modified somewhat his method of preparing

Milk Fermented by the Lactic Acid Bacillus (see MEDICAL ANNUAL, 1916, p. 324). He now dilutes with whey instead of water as much as possible, in order to take advantage of the saline constituents and vitamines of whey, and adds milk sugar instead of lactose. The addition of bicarbonate of soda to decrease the acidity has been discontinued, as the greater acidity is thought to be desirable as a protection against pathogenic bacteria.

J. Ruhrah[5] writes of the value of a combination of **Soy Bean Flour** and **Condensed Milk.** Each ounce of the flour contains 13 gr. of protein, and provides 120 calories. He makes a gruel composed of one level tablespoonful of soy flour, two level tablespoonfuls of barley flour, a pinch of salt, and one quart of water. This is boiled for twenty minutes, the water lost by evaporation being replaced. To this he adds condensed milk in strengths varying from 1–16 to 1–8, according to the age of the child and other circumstances. The gruel may afterwards be varied in composition as indications arise, and for older children may be doubled in strength. He has noticed that occasionally the barley flour in these mixtures gives rise to a sudden general œdema, which disappears if wheat flour be substituted. He recommends the use of these gruels (1) When fresh milk cannot be obtained, or when the milk supply is questionable; (2) In the summer months; (3) When the infant is found to be incapable of digesting cow's milk. It is also beneficial in certain cases of intestinal indigestion in infants, in chronic vomiting, and after summer diarrhœa. After an experience of six years he considers this method free from danger; it does not cause rickets. A little orange-juice removes any liability to scurvy.

Bartlett[6] points out that iron is present in smaller proportion in cow's milk than in human milk, 1000 grms. of cow's milk containing 0·4 to 0·7 mgrm. of oxide of iron, and 1000 grms. of human milk 1·4 mgrms. When cow's milk has been diluted, the iron becomes almost negligible in quantity. In this way may be explained, at least in part, the anæmia so commonly found in babies who have been fed for long periods on diluted cow's milk. Since the lack of iron manifests itself chiefly after six or seven months, he recommends that iron should be supplied at that age by gradually adding yolk of egg, cereals, green vegetables, and cooked fruit to the dietary. The use of green vegetables also favours calcium retention.

Premature Children.—Langstein[7] found that the best method in feeding such children consisted in introducing food into the stomach by means of a small tube. Very small quantities of milk, preferably human milk, were employed at first, and the children were fed every two hours. When there was no mother's milk available, cow's milk diluted with water, with added sugar, and containing a considerable fat percentage, was used. In some infants, cereal mixtures with sugar proved advantageous. Should any tendency to rickets or spasmophilia develop, calcium phosphate, calcium lactate, or tricalcol in combination with cod-liver oil were thought to give good results.

Indications of anæmia were sometimes found by examination of the blood as early as the second or third month of life. To combat this, small doses of iron were given as early as possible.

References.—[1]*Jour. Amer. Med. Assoc.* 1916, i, 1690; [2]*Surg. Gyn. and Obst.* 1915, ii, 657; [3]*Pract.* 1916, i, 584; [4]*Med. Rec.* 1915, ii, 955; [5]*Amer. Jour. Med. Sci.* 1915, ii, 502; [6]*Ther. Gaz.* 1916, 498; [7]*Berl. klin. Woch.* 1915, No. 24 (*Amer. Jour. Med. Sci.* 1916, i, 768).

INFANTILE PARALYSIS. (*See* Poliomyelitis, Acute Anterior.)

INFLUENZA IN INFANTS. *Frederick Langmead, M.D., F.R.C.P.*

According to Raimondi,[1] influenza is proved to affect infants between the months of October and May. During the first part of this period it is usually mild, lasting only three or four days; by the end of January it becomes more virulent, whilst from March to May it presents its severest forms. Infants affected at about the same time develop a similar form of the disease. At one time all may have the tracheal type with otitis; at another time broncho-pulmonary symptoms may predominate; at another either the nervous system or the gastro-intestinal tract may bear the brunt of the disease. The nervous form is seldom fatal. Influenza in infants is apt to recur, an infant sometimes passing through several attacks during one winter. Overheating, overcrowding, and confinement within doors favour its return.

Treatment.—At the first sign of the disorder he advises the application of antiseptics to the mucous membranes, employing **Petrolatum** or oil containing 2 per cent **Resorcin**, and cleansing the tongue and mouth with boric acid or a solution of bicarbonate of soda. For pyrexia he recommends a tepid bath morning and night. When bronchitis is present, this may be replaced by a mustard bath or pack; for this complication, cupping is efficacious, even for children a few days old. Should bronchopneumonia intervene, he injects **Emetine** (0·01 grm. per 1 c.c.) for four or five days in succession in doses varying from 0·25 c.c. for a child of one month of age, to 1 c.c. for one of ten months to a year old. The heart may need stimulation by injections of camphorated oil.

Reference.—[1]*Presse Méd.* 1916, 209.

INTESTINAL PROTOZOA. (*See* Protozoa, Intestinal.)

INTESTINAL STASIS. *Robert Hutchison, M.D., F.R.C.P.*

In the Cavendish Lecture for 1915, Keith[1] has put forward a novel view regarding the motility of the alimentary tract. His anatomical investigations have led him to the conclusion that the tract consists of certain definite neuromuscular sections, each of which is apparently marked off from its neighbours by the possession of certain structural and functional characters. A concrete and diagrammatic representation of these sections is shown in *Fig.* 54. Each section is cut off from its neighbour by a sphincter or sphincteric tract which effectively

blocks the passage of contraction waves and prevents them passing from one section to the next. Each section is presumably provided with a special centre, or pace-maker, where the chief contraction impulses arise. The alimentary tract, in short, may be likened to a railroad divided into sections, each provided with its signalman and telephonic apparatus. The signalman of one section refuses to accept any further traffic until his section is clear; all of them are closely correlated; and if one is blocked, the others, too, become automatically blocked. Disturbance in one section upsets the traffic in all. A functional or pathological derangement of this neuromuscular mechanism is, in Keith's view, the primary lesion of intestinal stasis. That lesion is the result of direct infection of the bowel wall or of absorption of the products of bacterial action. Blockage occurs at those junctional points where the passage of the intestinal contents is regulated under normal conditions. In stasis, in short, the signal system breaks down because there is a block on the line. Sagging of the viscera, intestinal kinks, and adhesive bands are merely secondary consequences.

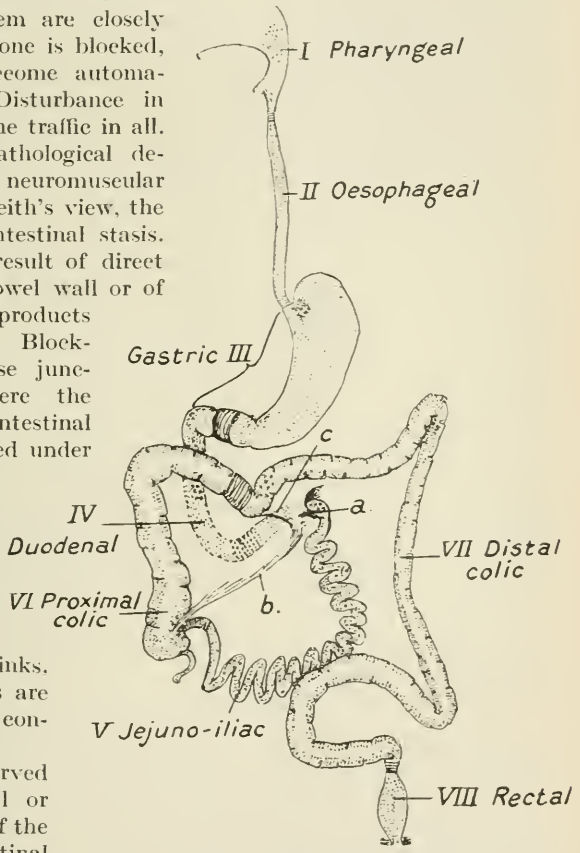


Fig. 54.—Diagram of the alimentary tract, showing the neuromuscular sections, which may be recognized in its whole extent. (*By kind permission of the Royal Society of Medicine.*)

It will be observed that this functional or physiological view of the mechanism of intestinal stasis is in marked contrast to the mechanical view advocated by Lane and adopted by many radiologists.

REFERENCES.—[1]*Lancet*, 1915, ii, 371 (see also *Proc. Roy. Soc. Med.* (*Electrother. Sect.*), 1915, Nov., 1).

E. Wyllys Andrews, M.D., F.A.C.S. (*Chicago*).

W. S. Bainbridge, of New York, discusses the operative findings in twelve cases of chronic intestinal stasis, reviewing the pathology as

laid down by Lane. While not accepting Lane's theories without qualification, he has received his view with open mind, and made a study of bands and kinks as found at operation. Diagnosis has been helped in his cases by the radiographic pictures and the fluoroscope. The symptoms have been principally of four types: (1) Pain or discomfort in the region of duodenum and stomach; (2) Gastric disturbance, nausea, and vomiting, due to obstruction of the outlet of the stomach from ulcer or cicatrices; (3) Various symptoms grouped as auto-intoxication, which Lane described as flooding the liver with a quantity of toxic material in excess of what the organ can deal with; (4) Constipation, or occasionally persistent diarrhœa. The verification of these points by operation is described in a series of cases in detail. In conclusion, he holds with Lane that no bigger question ever held the attention of the profession, since it has to do with the groundwork of disease, and primary causes underlying many obscure conditions.

R. B. Williams, of the U.S. Navy, discusses chronic intestinal stasis at the ileocæcal region and hepatic flexure of the colon. He claims that nearly all cases of stasis and obstruction are located at these two points. Among symptoms of this condition he enumerates attacks of abdominal pain in the epigastrium or right iliac region; local tenderness in these areas; constipation preceding attacks of pain and sometimes alternating with mucous diarrhœa; sensation, often limited to the right side, of gas distention; signs of auto-intoxication—headache, backache, loss of appetite, sallowness. A question of the permanency of cure by operation to remove these obstructions is of great interest. The writer reports numerous cases, with skiagrams before and after operation, nearly all showing marked improvement as a result of the operative removal of bands and kinks. The number of cases reported is eighteen.

References.—*Lancet*, 1915, ii, 769; *Ann. Surg.* 1915, ii, 326.

INTESTINAL SURGERY.

E. Wyllys Andrews, M.D., F.A.C.P. (Chicago).

Paralysis of the intestine after gunshot wounds is discussed by Owen Richards (Cairo) and John Fraser (Edinburgh). This serious complication seems to occur only in the small intestine. The distention and paralysis come on immediately above the injured coil, and the bowel below remains contracted. The condition is rapidly fatal if not relieved. They record three cases, and these reports are followed by a note of Cuthbert Wallace, consulting surgeon, who had examined them. He considers the pathology to be a functional block due to two causes: (1) The bowel portion each side of the lesion remains paralyzed from the trauma; (2) The interruption of Auerbach's plexus prevents the transmission of the peristaltic wave.

Other cases of post-operative ileus are reported by H. T. Hicks, of the Derbyshire Infirmary. These cases, five in all, seem to prove that much is to be hoped from second operations in the presence of

this complication. Like Handley and Bonney, the writer believes that lateral anastomosis between the distended small intestine and the transverse colon offers the best palliative cure. In desperate cases an open enterostomy may be more conservative.

Charles L. Gibson, of New York, discussing *post-operative intestinal obstruction*, describes 34 operations in his service in the past three years, of which 24, or 70 per cent, were the sequel of previous operations. Some were immediate, and some insidious after months or years. Late obstructions were in twenty-five days, three months, four months, nine months, one year, fifteen months, two years, two and a half years, four years, six years, seven years, eight years, and twenty-one years respectively. The writer asks what prospect of prevention of this condition we can expect. He considers of value anything which minimizes post-operative adhesions: thus, rubber drains in the place of gauze tampons may cause less local peritonitis where drainage is required. Obstructions following directly upon operation may be due to the agglutination of coils of intestine or forcible kinking and compression. Usually these are in the small intestine. Paralytic ileus comes in the presence of septic processes, and is a reflex inhibition from shock and infection. The patient's general condition is also that of sepsis, and the signs are almost identical with those of general peritonitis. Gibson thinks the use of **Pituitrin** has given greater hope in the management of these desperate cases. He described it as a veritable life-saver, and makes it the main excuse for writing his paper. Five cases are reported in which the drug seems to have had a positive value in controlling paralytic ileus. He lays great stress on the importance of fresh solutions in organotherapy. The dose should be repeated every hour to three hours until five have been given.

Mesenteric thrombosis is discussed by Elsworth Elliott, of New York, who also reviews the contributions of Jackson, Porter, Quimby, and Trotter. The fact that the main artery of the large and small intestine is a terminal vessel makes anastomosis impossible, so that a thrombus usually causes sudden gangrene of the entire distribution of the vessel or branch. The etiology of this disease may be the lodgement of an embolus in a large mesenteric artery. This is of cardiac or arterial origin. The occlusion may also be due to the formation of a thrombus *in situ*, or occlusion of a venous trunk by the formation of a thrombus from an inflamed intima. In this disease, signs of peritonitis and profound shock supervene, and very few cases have been saved by interference. When a portion only of the large or small intestine has become gangrenous, early resection has saved a few cases. The diagnosis is difficult, and in most instances has been made after the abdomen was opened.

Rupture of the intestine following non-perforating wounds or extra-peritoneal injuries is discussed by W. C. B. Meyer, J. W. Dew, and A. Stokes. Four cases are described in which there was abdominal laceration, not laying open the abdominal cavity, but in which the

external side of the peritoneum was exposed. In all, peritonitis and perforation occurred, and the autopsy showed an extension of the sloughing process to the wall of the intestine as the immediate cause of death. The writers do not attempt to explain these findings, but suggest that the result was due to concussion effect.

C. Wallace tries to arrive at the *relative frequency of abdominal wounds*, from the data collated in a certain number of casualty clearing stations. Statistics from nine field ambulances for six months showed a percentage of abdominal wounds to total wounds of 1·92 per cent. In 1098 abdominal wounds the mortality was 30·33 per cent. In 131 cases of perforating abdominal wounds it was 58·49 per cent.

J. C. Hubbard, of Boston, reports a case of *megacolon*, and presents a review of the literature. He regards the treatment as essentially surgical. In his case the ileum was anastomosed to the upper rectum or lower sigmoid after complete division, thus short-circuiting almost the entire colon. The patient improved steadily, and is now well.

Alternatives for colotomy are discussed by John S. McArdle, of Dublin. He condemns ordinary colotomy as unsurgical, though sometimes life-saving; but in his opinion four other measures may be substituted with advantage: (1) The sigmoid above the stricture can be anastomosed to the rectum; (2) If the sigmoid is fixed so that it cannot be brought down, the transverse colon may be anastomosed to the rectum. When this is not feasible, (3) The cæcum may be joined to the rectum. (4) The lower coils of the ileum may be joined to the rectum. The writer recommends the Murphy button as well adapted to these types of lateral anastomosis. By these means he avoids the discomforts of an artificial anus.

Clark, of Philadelphia, referring to Lane's most recent book on intestinal stasis, gives various reports of late coloctomies done in his clinics. In none of these has there been diarrhœa of long standing, or undue thirst. Six cases have shown marked improvement in nutrition. In the others there was no visible effect from the operation. He does not approve the total removal in most cases, but advises a less radical procedure.

Edred M. Corner discusses *carcinoma of the colon*, and from the St. Thomas's Hospital Reports he collates the following cases: Carcinoma of the cæcum, 20 per cent; of the ascending colon, 10 per cent; the hepatic flexure of the colon, 4 per cent; the transverse colon, 18 per cent; the splenic flexure of the colon, 2 per cent; the descending colon, 6 per cent; of the iliac and pelvic colon, 40 per cent. Some of these carcinomata remained without symptoms until they were far advanced, while others caused obstruction early. It is remarkable that tumours in the cæcum do not cause obstruction at first, but tend to be lateral and local in the gut wall. In the iliac and pelvic colon, splenic flexure, and transverse colon, they cause intestinal obstruction early. In the writer's experience, patients treated by palliative operation do better than when radical removal is attempted

at the time of acute obstruction. Radical operation can be performed later when the lateral anastomosis has subsided.

Forgue and Chauvin discuss *primary cancer of the duodenum*. A review of the literature shows that in 83,000 autopsies there were 6847 cancers, 642 being intestinal. Of these 39, or 6 per cent, were of the small intestine, and 4·3 per cent of the intestinal cancers were duodenal. They were able to collect 45 cases of cancer of the duodenum. They find that it localizes by preference at the ampulla of Vater. Of these cases the authors found 4 gastro-enterostomies, with 2 recoveries and 2 deaths. Only 4 cases were removed radically.

References.—*Brit. Med. Jour.* 1916. ii, 11; *Rev. de Chir.* 1916. xxxiv, 470: *Clin. Jour.* 1915. Oct., 348; *Surg. Gyn. and Obst.* 1916, xxii, 533; *Pract.* 1916, June, 578; *Lancet*, 1915, ii, 1140.

INTRACRANIAL HÆMORRHAGE IN THE NEW-BORN. (*See* Hæmorrhage in the New-born.)

JAUNDICE, INFECTIVE. (*See* Weil's Disease.)

JAWS, WAR INJURIES OF. *W. H. Dolamore, M.R.C.S., L.D.S.*

Injuries of the jaw, with or without surface lesions, have been very numerous among all the combatants. In Lyons alone, 800 beds are devoted to these cases. Much has been written in all countries concerning their treatment. Time is not ripe to decide between the various methods advocated: therefore, an attempt is made here only to indicate briefly the means adopted, and to draw attention to certain points concerning which there appears to be a fairly unanimous consensus of opinion.

The larger number of these injuries are gunshot wounds, using the term in its widest sense: but a considerable number of fractures have been due to other causes, such as kicks of horses, motor and aeroplane accidents, blows from stones, or from being buried by shell or mine explosions, etc. The treatment and character of the latter, provided there be no facial wound, does not differ from those seen in civil practice; but among the large number, some occur which are uncommon. Thus *Fig.* 55 shows a fracture of the horizontal ramus associated with a vertical fracture of the ascending ramus of the mandible. It was the result of a motor-bicycle accident, the patient falling on the chin. Such an accident, according to rule, should have fractured the neck of the condyle. *Fig.* 56 shows an oblique fracture of the mandible, running backwards and downwards from the socket of the third molar tooth on the right side. The only objective symptom present was slight redness of the gum margin around the tooth, such as is frequently seen when this tooth erupts, as had recently occurred in this case. The patient suffered only slight discomfort, but had heard a crack during the accident to the aeroplane; hence the skiagram was taken.

Simple fractures posterior to the third molar tooth often show no displacement, but usually some movement can be felt by digital

manipulation. In fractures of the ascending ramus, when there is displacement, probably because the injury has destroyed the attachments of the masseter in the neighbourhood of the fracture, the horizontal ramus is drawn forward by the internal pterygoid muscle and the superficial fibres of the masseter. In fractures of the horizontal ramus anterior to these muscles, it is drawn backwards, inwards, and upwards.

Gunshot Injuries.

In previous wars, statistics show that the point of entry of the missile was usually on the left side, the exit being on the right. Possibly owing to the altered character of this war, there does not seem to be such a difference, but statistics are not yet available. Sometimes the point of entry has been behind the mandible in the neck, the point of exit and the fracture of the mandible being on the same side. Sometimes it has been over one maxilla, this bone being extensively, or but slightly, damaged, the exit being through the mandible on the opposite side, which has been badly comminuted or even a portion torn out. Again, the point of entry has been below the level of the mandible on one side, the exit being through the mandible on the opposite side. Or both sides of the mandible may be struck and comminuted, the anterior portion being left without any support save that of the soft tissues, which also are frequently torn.

In many cases, when the bullet strikes the lingual surface of the mandible it is deflected, the exit being in the neck. If the mandible is struck by a glancing shot, the point of entry and exit being sometimes close together, then there is usually no loss of tissue, but the fracture is widespread and comminuted.[2]

Surface Wounds.—The surface wound at entry has the usual characteristics; but, if portions of the bone and teeth are torn out, that of exit may be very large, the edges being torn and much contused. It is said that actual loss of soft tissue is quite uncommon.[10]

A considerable discussion has centred round the treatment of the surface wound. It is agreed that if the mandible or maxilla be fractured, a splint must be inserted before any attempt is made to close the wound. When this has not been done, not only is there excessive surface scarring, but also marked facial deformity. The latter is due to displacement of the bone at the time of injury, and subsequently to muscular contraction, the pressure of bandages, and contraction of scar tissue (*Fig. 57*). Even when it has been possible to apply early a simple type of splint, it is better to wait, if the wound be extensive, till the mouth and wounds have been rendered as aseptic as possible, before inserting surface sutures. If sutured before the mouth is clean, the margins frequently slough, and subsequent plastic operations are rendered more difficult.[4] It is now agreed that no attempt must be made to wire the bone early. This has been attempted many times and has failed. The only exception recorded, far as is known, was a case admitted to the hospital at Strassburg,

Fig. 55.

Fig. 56.

Fig. 57.

Fig. 58.

PLATE XXIX.

WAR INJURIES OF JAWS AND THEIR TREATMENT—*continued*

Fig. 59.

Fig. 57.

Fig. 58.

PLATE XXIX.

WAR INJURIES OF JAWS AND THEIR TREATMENT—*continued*

Fig. 59.

Fig. 60.

Fig. 61.

and in this case a dental splint had also been applied.[11] Certainly in many cases it has been a contributory, if not the sole, cause of subsequent necrosis of the bony fragments.[5] Late suturing, when it can be done aseptically without opening the oral cavity, is different. If the wound is large, with contused margins, it is advised that these be supported and approximated by narrow strips of strapping or by bandages lightly applied, etc.[10] If sutures are essential, it is best to use deep wire sutures, tied over plates, placed on sound tissue.[4] When the upper lip is so torn that it hangs down attached only by its margins, support can be given by wire hooks passing under it and fixed by strapping on the forehead, the pressure of the hooks being relieved by gauze pads (*Fig.* 58). If the lower lip and chin be so torn that it is inverted and hangs down, then a useful form of sling is shown in *Fig.* 59. The lower portion of the sling is formed of rubber, which keeps up a gentle tension. Such an injury is usually associated with bilateral fracture of the mandible. The anterior portion of bone may be torn out. If not, it will drop down. This carries with it the attachment of the tongue, which in consequence swells, quite apart from any direct injury to it. Hence the patient suffers from dyspnœa and dysphagia, and cannot speak. As a first aid, relief is given if the bone be replaced in its normal position and retained by a ligature tied to the mandibular incisor teeth below, and above to a head bandage, or a cap, or to a piece of wire as seen in *Fig.* 60. This wire is fixed to a cap. Ordinary galvanized iron wire answers. Such a wire can also be improvised temporarily to support the maxilla when this is broken away from its cranial attachments and displaced.

The surface wound is dressed and treated in the usual manner but only lightly bandaged unless pressure be needed to arrest hæmorrhage. Oral wounds should from the first be frequently syringed with peroxide of hydrogen, permanganate of potash, or iodine; if these, or other medicaments, are not available, syringing with water is better than nothing. A convenient and efficient syringe is the dental chip syringe, the nozzle of which allows all parts of the mouth to be easily reached. It can be used by the patient. The simplest and cheapest form is also the best, but the bulb should be stiff and of good red rubber, so that it can be boiled.

These wounds being excessively septic, unless these precautionary measures are taken respiratory pneumonia frequently follows. It is said that in these accidents the swallowing reflex is abolished, and that it is also inhibited by the use of morphia. **Pyramidon** is advocated as a substitute to relieve pain.[11]

In all jaw injuries a skiagram is essential to correct treatment. It should be taken stereoscopically. The field of a skiagram not being equally defined at the periphery, it is best to have two or more taken, each being centred on a different portion of the injured area.[2] In many cases films are also used as complementary to the plates. They frequently disclose small bodies, e.g., portions of metal, not shown

in the plates, which would interfere with union in plastic operations, bone-grafts, etc.: or foreign bodies interposed between the bony fragments, such as a piece of metal, a tooth, or a portion of a tooth. These must be removed. In some instances the line of fracture is seen to run into a tooth socket; it is usually better to remove the tooth. Some have made it a rule to remove the tooth on either side of the line of fracture in all cases, whether in war injury or in civil practice.[2] This view is probably not accepted by the majority, and is proved by results not to be necessary in many cases, provided splints are applied early. It must be noted that in gunshot injuries the pulps of all teeth near the injury may be killed. These pulps become septic: hence, if the teeth are not removed, the pulp cavities should be opened, the dead pulps removed, and the cavities sterilized and filled.

Splints.

When teeth are present in all the fragments of bone, no attachments for the splint are better than these: but if teeth be absent in one or more fragments, then other fixed points must be obtained. Therefore splints are divided into intra- and extra-oral, but frequently both are used in combination.

Intra-oral Splints may be grouped into wire splints and cap splints. The simplest *wire splint* is the Hammond (*Fig.* 61), which

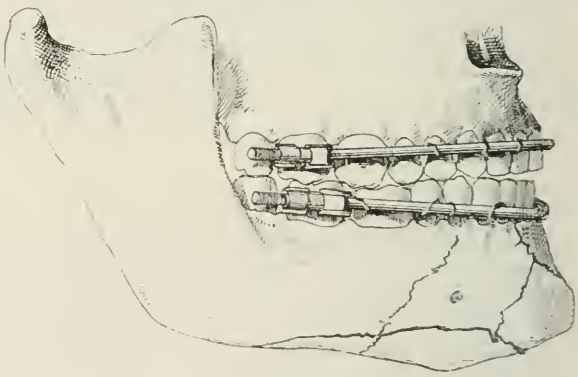


Fig 62.

consists of a wire encircling all the teeth and roughly fitted to the contour of their necks. To this wire the teeth are ligatured, using binding wire. In the Angle and the Sauer or Schröder (*Fig.* 62) form, a wire is fixed to two or more teeth, preferably molars, by thin metal bands having a binding nut and screw, cement being used inside the bands. The bands in the latter form are stronger than in the former, and, whilst in the Angle the wire passes through a tube soldered to the band, in the latter its ends form the screw. To this wire the teeth are ligatured. Misplaced teeth and, consequently, the bone

Fig. 63.

Fig. 64.

PLATE XXXII.

WAR INJURIES OF JAWS AND THEIR TREATMENT—*continued*

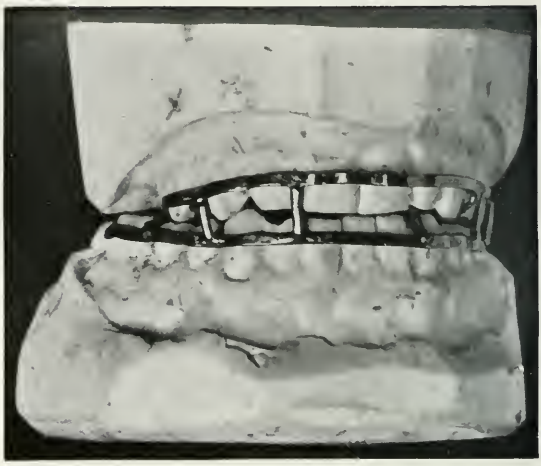


Fig. 65.

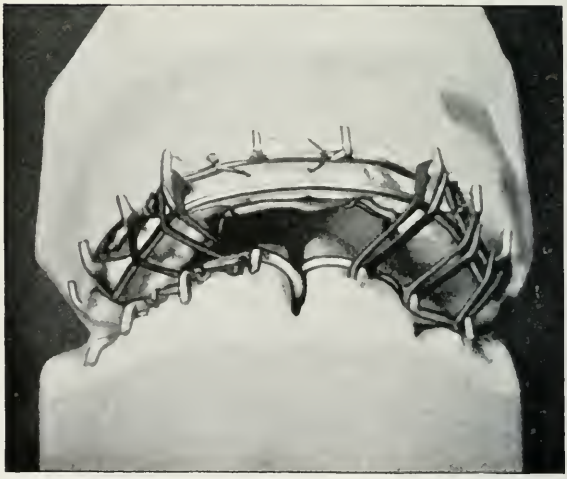


Fig. 67.

PLATE XXXIII.

WAR INJURIES OF JAWS AND THEIR TREATMENT—*continued*

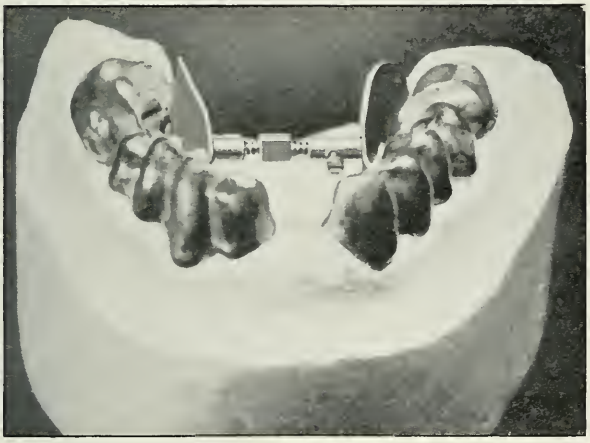


Fig. 68.

Fig. 71.

in which they are implanted, are brought into position by the traction of the wire ligatures. The chief advantage is that these splints can be bought ready made; the bands also give greater fixity than wire ligatures, and hence are used when only few teeth are present and the resistant force is great. Similar splints are used in which for the bands, as bought, are substituted metal collars, or metal caps, fitted and cemented to two or more teeth. To these collars and caps the wires are soldered. As a first-aid measure any piece of wire can be bent to approximate the labial surface of several teeth on each side of the fracture. The teeth are then tied to it. Later, a firmer means of fixation is substituted.

Cap splints are made in either vulcanite or metal. If the latter are to be removable, the metal used is tin. It is claimed that tin is less irritant to the gum than vulcanite, and it can be boiled. But if it is desired to fix the splint permanently—and many consider it preferable—then only the crowns of the teeth are covered with thin metal, gold, silver, or alloys of copper, struck or cast, to fit over the crowns. If some teeth are absent, the caps over the existing teeth are joined by a wire placed as far from the gum as possible, so that this may be kept clean, and sequestra, etc., be removed (*Fig.* 63). This splint is cemented to the teeth.[5]

A combination of these two types is often used. Thus, a vulcanite cap splint may have a wire clasp round one or more teeth. Or a splint resembling a Hammond may, for greater security, be joined to a band grasping a single tooth, usually an isolated molar.

When the central, or mental, portion of the mandible drops down, no teeth, or an insufficient number, being present in the other fragments to support and fix the splint, then the upper teeth are used as fixed points to support the lower; or, less frequently, the lower are used to support the upper. Two splints are made, one to fit the maxillary and one the mandibular teeth. If these splints are made of wire, then the two are bound together with binding wire; but if of metal, they are soldered together at their points of contact (*Fig.* 64). A form of splint much favoured by some was designed by Lewin Payne (*Fig.* 65). It is also called the prophylactic splint[16] and the cradle splint. It consists of two wire splints fitted to the upper and lower teeth and joined by vertical wires. It is chiefly indicated in fractures of the maxilla. The maxillary teeth rest in this splint as in a cradle. Many cases have been treated by fixing metal crowns to the teeth, or roots of teeth, and joining these crowns by metal bridges bearing artificial teeth[8]—in short, by bridgework. Such bridges undoubtedly act as efficient splints, and good results are obtained. The use of these is very largely mixed up with the considerations affecting the use of bridges in civil dental practice. But they certainly have a place when used to support newly-formed bone after a bone-graft has been inserted and the ordinary splint removed. Even should their removal be indicated in a few years, it is hoped the bone will then be strong enough to support a denture. As a

first-aid measure a fractured mandible may be temporarily supported by simply tying the lower teeth to the upper.

In moulding these splints, models are made of the upper and lower teeth. The model is divided in the line of the fracture and reset in a corrected position, using the articulation of the teeth as a guide. If proper articulation is apparent, the splint is correct; but if teeth are absent, the splint may not fit properly. In Paris,[14] therefore, ligatures are tied round the teeth, and the portions of bone in which they are implanted are drawn into their correct position. A block of warm wax is placed between the upper and lower teeth, and the latter, in their corrected position, are pushed into this. This forms an impression from which a model is obtained on which the splint is made. Good results are claimed.

Extra-oral Splints.—In these the fixed point is either a skull-cap of cloth, leather, or webbing; or a bandage round the head in the occipito-frontal region, reinforced by plaster or wire; or a leather strap may be substituted for these. The fixed point is used as an attachment for vulcanite arms, or wires passing downwards and curled to form springs that press upon and support, through interposed pads, bony fragments of the maxilla or of the angle and ascending ramus of the mandible. A four-tail bandage is in effect an extra-oral splint, but to avoid pressure and displacement of the bony fragments it is wiser to cover the chin with a cap made in metal or moulded in vulcanite. Gutta-percha or poroplastic can be used in an emergency.

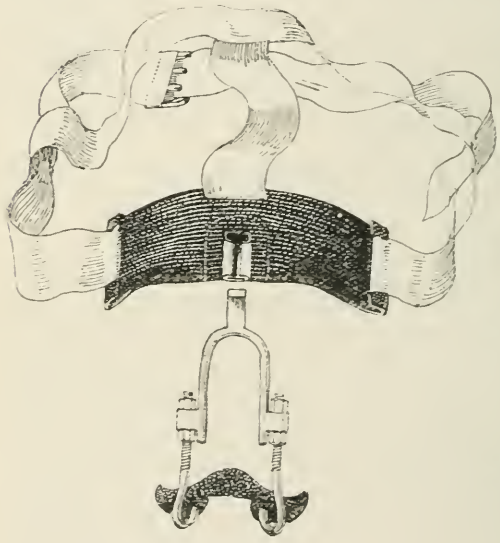


Fig. 66.

Extra- and intra-oral splints are used in combination when no teeth, or an insufficient number, are present in the mandible; and in all fractures of the maxilla separating it from its cranial attachments (*Fig.* 66). The intra-oral splints have arms from which bandages, straps, or elastic bands pass to the head bandage. A like idea is the joining together of a mandibular splint and a chin-cap by similar means. The one forms an opposing point to the other, and the mandible is gripped between them.

PLATE XXXIV.

WAR INJURIES OF JAWS AND THEIR TREATMENT—*continued*

Fig. 72.

Fig. 73.

Fig. 74.

Fig. 75.

As a first-aid measure, a dentist's impression tray, or any similar and roughly bent-up metal trough, may be filled with dentist's impression compound: this, when warm and soft, and whilst the fragments of bone are held in as correct a position as possible, is pressed over the teeth. When the compound is cold and hard, bandages are passed below the chin, or over the skull, and also over the handle and as much of the body of the tray as possible. Specially prepared trays or troughs are made without handles but with a long wire to pass outside the mouth,[12] or with wire loops,[5] which form the attachments for bandages, straps, or elastic bands.

Considerable discussion has arisen concerning the earliest moment at which the fixation of a splint is permissible. It is agreed that whilst a condition of shock persists it may not be wise to disturb the patient; but some contend that the septic condition of the mouth, which has developed during the enforced waiting period, should also be cured before the splint be fixed. It is also further agreed that the splint must be of such a form that it will allow every part of the mouth and wound to be syringed; that the fixing of the fragments relieves the patient of considerable pain; that the earlier the misplacements are reduced the better and more easily a good result is attained. Hence, if it is impossible to adjust the permanent splint, some temporary appliance should be fixed at the earliest moment to allow the mouth to be opened easily and painlessly and to be thoroughly cleansed.

Reduction of Displacement.

When it is impossible digitally to reduce the misplaced portions of bone, but still more when the parts, owing to early neglect, are fixed by scar tissue in a misplaced position, then it is sought to cure this deformity either by dividing the scar tissue, placing the parts in their correct position, and fixing them there by means of a splint; or the malposition is gradually corrected by means of various mechanical forces.

Intermaxillary Traction.—This term is applied to the power exerted during the tying of ligatures, generally wire, between two splints fastened respectively to the mandibular and to the maxillary teeth. This force is intermittent, and is commonly used to lift up a depressed portion of the mandible. When continuous traction is desired, elastic bands are used, and with these it is possible, by altering the point of attachment, or by causing them to glide over wire arches properly arranged, so to vary the direction of the force that a fragment may be pulled in any direction desired. Sometimes one fragment has to be moved in one direction but another in the opposite. Then each group of teeth, in each portion of the fractured bone, will have its own separate splint—cap or wire; and to these splints, hooks or studs will be soldered as points of attachment for the elastics or binding wires (*Fig.* 67). The maxillary splint will be in one piece, but with similar hooks or studs. In some simple cases

a single wire splint suffices. The wire arch is left standing away from the teeth, which are drawn out, or in, towards it by means of ligatures or elastics. By these comparatively simple means many deformities have been corrected.

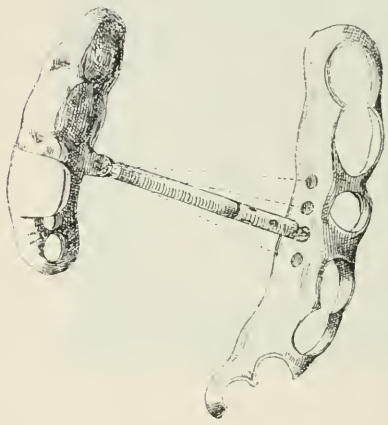


Fig. 69.

Jack Screws.—When two sides of the mandible fall together, as inevitably happens when the mental portion of the mandible is lost, unless a splint be inserted early, then jack screws are used to force the two portions into their proper alinement. These may be fixed by bands to a single tooth, but it is preferable to distribute the pressure over several teeth, using metal cap splints to fit over the teeth in each fragment (*Fig.* 68). The screw then passes across from one cap to the other. To vary the direction of the force, the screw may be hinged to one cap and fit into one of a series of depressions on the other, the direction being varied, as required, by placing it in any one of the depressions (*Fig.* 69).

Springs.—Sometimes, instead of a screw, a curled wire is used, acting as a recoiling spring (*Fig.* 70). This is a method adapted from the Coffin spring used to regulate children's teeth.

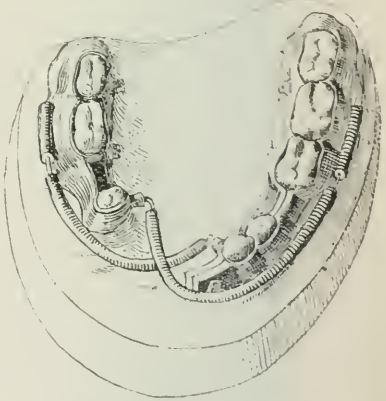


Fig. 70.

Inclined Planes.—Strictly speaking, this is not a force but a mechanical device by which the power exerted by the muscles of closure is brought to bear upon a misplaced fragment to move it in the direction desired. The inclined-planes are joined to fixed cap, or wire, splints, and slide upon a second plane fixed to the maxillary teeth. Rods and tubes are often used, based on the same principles (*Fig.* 71).

When one side has to be moved a greater distance than the other, a flange is soldered to the cap splint covering the teeth of the latter, which flange, when displacement is corrected, locks against the upper teeth, so checking further movement; but the former side

s still free to move until it reaches its normal position. These flanges are used with any splint, irrespective of the force employed.

Great difficulty has arisen in correcting misplacement of, and in fixing, the ascending ramus, or the ascending ramus connected to a fragment of the horizontal ramus in which no teeth are implanted. In the latter case fixity can be attained by a saddle of metal,[3] or rubber, resting on the stump of the horizontal ramus, and connected by a wire to a splint attached to teeth in other parts of the bone (*Fig.* 72); even some degree of misplacement may be corrected by using the connecting wire as a spring pushing in the desired direction. In the former case the following method has been adopted:[4] A skin incision is made in the position of the lower border of the mandible. The wound is deepened obliquely till the misplaced bone is reached. The periosteum is separated from the lingual surface of the bone; it is then turned outwards and a hole drilled through it from within out. Through this hole a threaded wire is passed that is made to perforate the cheek and to project a few inches beyond. A metal washer is passed over the wire on the lingual surface, and secured by a staple passed through an eyelet in the end of the wire. The periosteum is replaced and stitched, then the muscles and fasciæ, then the skin. A soft metal washer is placed over the wire on the cutaneous surface and bent to the contour of the face; over this a rigid washer is passed, and the whole is fixed by a nut screwed to the wire (*Fig.* 73). Thus a purchase is given, to which elastic bands can be attached, and these passing to a wire fixed to a head bandage, pull the bone in the desired direction (*Fig.* 74). When the misplacement is corrected, fixity is obtained by joining the wire to a splint fixed to the teeth in the anterior fragment of the mandible (*Fig.* 75). This method is used when there is loss of substance, as a preliminary to the insertion of a bone-graft.

A brief statement can scarcely do justice to the considerable ingenuity which has been shown in varying these splints and in successfully bringing a corrective force to bear in a particular direction to meet the requirements of cases.

When the deformity is corrected, these mechanisms are removed, and the bone is kept in its normal position by fixing a splint of one or other of the types described; or two or more separate splints covering the teeth in the fragments may be left in place, but joined by a wire, or wires, passing from one to the other; or they may be soldered together *in situ*, tin being recommended for this purpose.[15]

The displacement of the fragments of the bone is the result of three factors: (1) The direction of the missile; (2) The contraction of muscles attached to the bone; (3) Contraction of scar tissue. Only the result of the second factor can be predicated from a knowledge of the position of the injury, but even then the normal pull of the muscle, or groups of muscles, may have been neutralized by either of the other factors. Thus, in a unilateral fracture in the premolar or molar region, the distal portion of bone will be pulled upwards

and inwards by the muscles of closure of that side, whilst the medial portion may remain in its normal place or be pulled over to the injured side. Sometimes the distal portion, instead of being to the lingual, may be to the buccal side of the medial portion. In such cases bony union commonly follows, since the pull of the muscles, probably the superior constrictor, keeps the posterior in contact with the anterior fragment.[2] With the usual displacement the reverse is the case, the ends being pulled apart, or at least not left at rest, and therefore, unless this be prevented by splinting, the fractured bone may not reunite. Hence the normal displacement is by some purposely converted into the abnormal, as a method of treatment to obtain bony union.[2]

Comminution and Loss of Substance.

In gunshot injuries comminution is frequently present, markedly so when the injury is the result of a glancing shot. The size of the fragments varies. They may be very numerous and quite small, or comparatively few and large. In both cases considerable displacement occurs of the fragments and of the remains of the mandible. Experience has formulated one golden rule—no fragment should be removed unless it is quite separate or until it has been cast off naturally. Even pieces that are apparently separated from any periosteal attachment seem, when the parts are kept clean and at rest, to become fused to other fragments, leading to a bony union. Pieces that project in the floor of the mouth, or wound, become covered by granulation tissue, though the superficial part may be absorbed, and some even exfoliate.[11]

Frequently portions of the bone are completely shot away, or they may subsequently necrose because, unfortunately, of lack of treatment, or even mal-treatment. These cases may be grouped in two classes. (1) Those in which the loss of tissue is small and the deformity slight, if the remaining portions of the mandible be allowed to come together to obtain bony union. (2) Those in which the loss of tissue is so great that bony contact is either impossible, or only possible with marked deformity. Between these two groups there is a middle class which some place in one group and some in the other. All desire to obtain bony union; but even when this cannot be proved to have occurred, a very firm, semi-cartilaginous union has followed, as for instance in a series of cases reported by Hashimoto in the Japanese War.[7] Such a union, combined with mechanical dental appliances, may have a good immediate result. It is the ultimate result which is unknown, and it is hoped such cases may be watched and recorded. The condition of the teeth must influence the treatment. If those in the mandible are few, decayed, or septic and loose, their retention cannot be important, since they would certainly not last long. Extraction of teeth in the maxilla leads normally to a smaller alveolar or gum margin; in the mandible to a larger. Hence a limited contraction of the latter is an advantage rather than otherwise, to the

PLATE XXXVI

WAR INJURIES OF JAWS AND THEIR TREATMENT *continued*

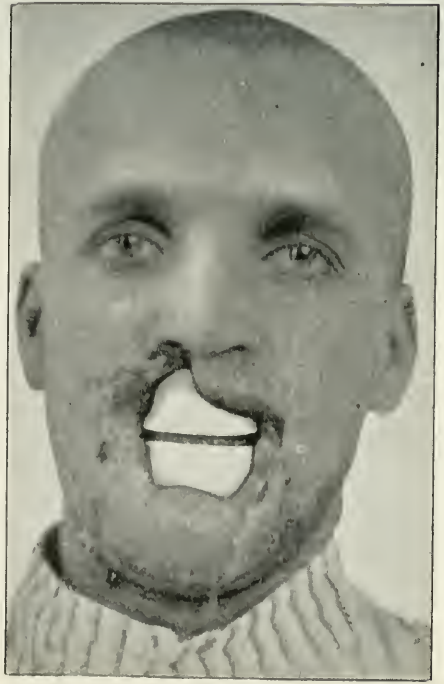


Fig. 76.

Fig. 77.

PLATE XXXVII.

WAR INJURIES OF JAWS AND THEIR TREATMENT—*continued*

Fig. 81.

PLATE XXXVIII.

WAR INJURIES OF JAWS AND THEIR TREATMENT—*continued*

Fig. 82.

Fig. 83.

PLATE XXXIX.

WAR INJURIES OF JAWS AND THEIR TREATMENT—*continued*

Fig. 84.

adaptation of artificial dental substitutes. But if the dentition be nearly complete, many regard the retention of these teeth in normal occlusion as the prime consideration. Still, some do not hesitate to remove the teeth on one side if by so doing they obtain bony union. Thus, when bone is lost in the molar region, the distal fragment, if edentulous, may swing forward and upward sufficiently to come in contact with the medial portion; but if molar teeth are present in this distal fragment, their occlusion with the upper molars will check this. It may also be prevented by the maxillary molars pressing on the anterior margin of the ascending ramus and so holding it back. The treatment, therefore, consists in extracting both upper and lower molars, so allowing this displacement to take place.[2] Bony union is undoubtedly obtained, and the facial deformity left in the region of the angle is but slight. Final judgement on this method must depend on whether the use of bone-grafts can be so developed as to become a routine, surgical procedure.

Use of Shields in Plastic Operations.

When large portions of bone are shot away, there is associated tearing, even loss of substance, of the adjacent skin and soft tissues. After the fractured bones have been placed in their normal position and the mouth is clean, it may be necessary to suture the surface wounds or close them by a plastic operation. It is advised that before doing so a properly shaped shield should be fixed, over which the skin flaps are moulded (*Fig.* 76). These shields are made of metal (tin being specially commended), and are fixed to the jaw splints. The method of attachment should allow their separate removal and replacement. Where there is great loss of tissue in the region of the symphysis, or of portions of the maxilla, they are formed in vulcanite to resemble in shape the lost portion of bone, and artificial teeth are attached, not only to be of use, but because their appearance is said to please the patient and to encourage him to look forward to a successful issue of the effort of the surgeon to remodel the lost or damaged soft tissues. When no teeth are present in the mandibular fragments the splints are attached to the maxillary teeth, but then an opening must be left through which the patient can be fed (*Fig.* 77). It is claimed that these shields assist the surgeon in a more natural shaping of flaps to replace lost tissues by means of plastic operations; that they assist the healing of flaps by supporting them and keeping them at rest; and that to a great extent they prevent subsequent contraction of scar tissue. It is advised that the shields should be more prominent than the normal, even though this may make the surgeon's task more difficult, since, even if they be used, some contraction must take place.

Plastic operations are also undertaken to remove scars, especially when associated with facial deformity, the result of stitching up the wounds before the fractured bones have been fixed in their normal

position. Such scars are also treated by slow stretching. The adhesions to the jaw-bones are divided, and a pad of rubber, fixed to a splint, is inserted. Rubber or gutta-percha is added from time to time to the surface of the pad, so that the scar is lifted up and finally stretched to the desired extent. As an alternative, a pad is mounted on an arm, which is hinged to a splint. An elastic band attached to an extension of the arm pulls this extension towards the splint; thus the arm moves on a fulcrum and presses the pad against the scar. This slow stretching may be assisted by digital stretching, massage, Bier's suction treatment, and exposure to sunlight or strong artificial light. Sufficient time has not elapsed to know whether the effect of this treatment is permanent; but if it is intended to replace lost bone-tissue by a graft, it is believed to be wiser to excise scar-tissue at the seat of operation. Suppuration in scar-tissue has complicated or caused failure of the healing of bone-grafts.

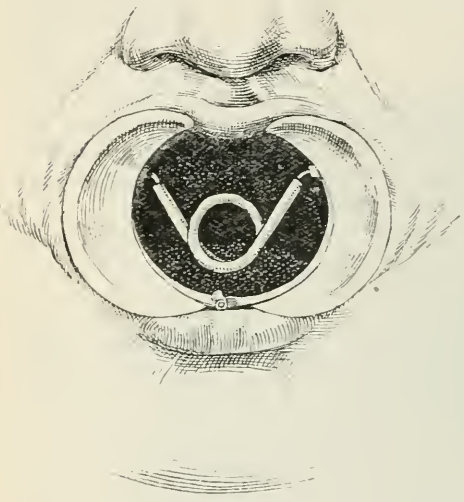


Fig. 78.

Similar methods are used to dilate a contracted oral orifice. *Fig.* 78 shows such an apparatus used in Paris. Two semicircles of metal, joined by a hinge, have attached to them moulds of soft rubber which fit over the lips. The two halves are forced apart by the recoil of a bent spring of piano wire.[14] At Würzburg two retractors are made to fit over the angles of the oral orifice, and to these are attached elastic bands which pass backwards to the skull-cap.[4a] At Düsseldorf the form shown in *Fig.* 79 is used. In this an elastic band, by drawing its points of attachment together, pushes apart the crutch-shaped ends of the wires which rest in the angles of the oral orifice.[4]

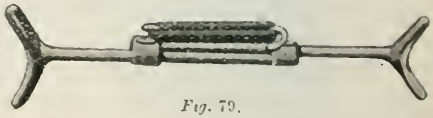


Fig. 79.

The prolonged treatment necessary for war fractures leads to the formation of adhesions between the mucous membrane of the cheek and gum. These are divided and kept separate by packing till covered by epithelium: but the scar tissue, and possibly adhesions in the joint, prevent the mandible being moved away from the maxilla. Various means have been adopted in treating this condition. The

apparatus (*Fig.* 80) designed by Holt is used at the Croydon War Hospital. The two plates are separated "just not to cause pain."[2] By some an ordinary wooden paper-clip is used, the handles being placed between the teeth. Massage, sometimes with mercurial ointments, of the masseter region, is said to assist. This is on the assumption that the condition is partly due to serous infiltration of this muscle.[3]

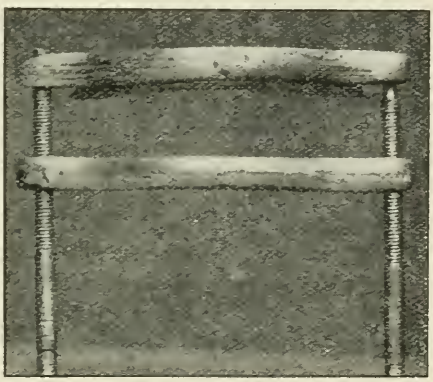


Fig. 80.

Similar methods are used to dilate the nasal orifice and to lift up the soft parts of the nose. When a plastic operation is to be undertaken to remould the nose, shields are also recommended. The support for the shield, or for the plug used as the dilator, may be either a head bandage or a dental splint. In many cases fractures of the jaws are associated with damage to the nose, and therefore the one appliance can be made accessory to the other.

These shields are also used to attach pads of hard material or of gauze soaked in mastic, to prevent adhesions between the underlying bones and the flaps in plastic operations. The difficulty of preventing suppuration and obtaining primary union in plastic operations about the mouth has led to the use of deep supporting sutures of nickel wire tied over plates (*Fig.* 81). It is claimed that these take any strain off the fine suture used to close the skin wound. If the latter gives, the wire sutures keep the flaps in place, and by tightening them the skin margins can again be brought in contact should they have separated.[4] When a flap is brought up from the neck to re-form the lower lip, support is obtained by tying the upper end of the wire suture to a head bandage (*Fig.* 82). To lessen the size of the puncture, these wires are soldered to a needle, so that the double thickness of wire, otherwise necessary if threaded through the eye of a needle, is obviated. It is advised that the base of the flaps be made as wide as possible, and if in turning them their blood-supply is interfered with, they should be left supported by the wire sutures, and the wound not sewn up for twenty-four hours. Good results are claimed from the use of a modification of Klapp's suction-glass, sloughing being prevented by the hyperæmia resulting (*Fig.* 83). Their use is also said to assist in the thickening of the flap, especially when, the lower lip and chin having been re-formed, it is desired to obtain a prominence to represent the latter. This may also be obtained subsequently by use of a large autogenous fat-graft, especially recommended when the flap is thin, to obtain a bed in which later a bone-graft may lie and be nourished.

Bone-Grafting.

Whatever may be the views held as to the proper treatment when only small pieces of the mandible are lost, if these pieces are large the only real cure is the insertion of a *bone-graft*. By many the result of bone-grafting is held to be uncertain in spite of some successes. This is denied by Lindemann, who has recorded ninety-seven cases.[4a] A large number were completely successful, and only two or three can be described as absolute failures. His article being, so far, the only attempt to publish details of technique and of any considerable number of cases, a brief *résumé* may be added. He acknowledges his technique is founded on Axhausen's experiments.[1]

(1) The bony fragments must be in their normal position and absolutely fixed by means of splints. (2) The operation should not be undertaken till it is certain bone may not form normally between the fractured ends. This waiting period varies from a few months to a year. (3) By means of careful examination of the mouth it must be shown that the mucous lining is intact and need not be opened during the operation. Mucous pouches between the ends of the bone are to be especially noted and eliminated. (4) There must be no sequestrum or foreign body in the field of operation. They are usually septic and in a small pocket of pus. (5) Scar tissue crossing the line of incision should be previously removed. (6) A curved incision is made so that the surface wound does not lie over the graft and (in case of stitch suppuration, etc.) lead to its infection.

(7) The ends of the mother bone being exposed, any rarefied or sclerosed tissue is removed with a file, and holes are drilled in the ends near the skin. The periosteum is previously separated, to leave a lingual and buccal flap. If the mucous membrane of the mouth is adherent to the periosteum, and it is impossible to separate a lingual flap, the buccal flap is left longer. If the shape of the bone prevents a hole being drilled in it, then it is pointed and a corresponding hole drilled in the end of the graft. (8) The subcutaneous tissue between the ends of the mother bone is only divided deeply enough to receive the graft. If a fragment of live bone lies between the ends, this is pushed to one side; but if this cannot be done, a curved graft is cut to pass round it. On no account should it be removed, since the hole left would prevent the graft being in contact with vascular tissue.

(9) The graft is taken from the tibia, but if a curved one be desired, from a rib at the scapular line. (10) The periosteum is left on the graft and as much medullary tissue as the size of the graft permits. The periosteum at the ends is left long to form flaps. (11) The graft is cut a couple of centimetres longer than required, and is afterwards pointed at either end. Good results have apparently followed making cuts through the periosteum to the bone, according to Axhausen's suggestion. (12) The graft is sprung into place, the periosteum smoothed, and the periosteal flaps of the mother bone laid over those

of the graft. Care is taken to see the graft is in contact with the tissues, no space or blood-clot being left. The muscles and fasciæ are stitched together, and then the wound margins. (13) Only light dressings are used to cover the wound, which is painted with iodine. (14) The wound is gone over frequently with a suction-glass to remove any serum or blood. (15) If suppuration follows, the pus is removed by suction ; or, if abscesses form, they are incised. Even if sequestra separate, every endeavour is made to keep the remainder of the graft in place so that new bone may develop from the periosteum.

(16) The splints are kept in place for many months, even a year. If this is not done, the contraction of scar-tissue may displace the graft. Lindemann holds, after Axhausen's teaching, that the whole graft is replaced by new bone.

Details of an interesting case are given in which a graft from a rib, 12 cm. long, was inserted. In doing so a small sequestrum and pus pocket, not disclosed in the skiagram, was opened. A kink had formed in the graft when it was bent to spring into place. Suppuration and abscesses followed. Three months later, first the left and then the right portions of the graft were thrown off ; but by this time the periosteum on the graft had become united to the tissues forming the bed, so that new bone formed and the gap was closed except to the extent of $\frac{3}{4}$ cm. upon one side. If such a pus pocket be opened, Lindemann advises that the further operation be postponed. Except for the administration of ether twice in prolonged operations, whilst the wound was being closed, in all his cases novocain was used, being injected into the nerves.

One successful case is recorded by Hopson[9] in which Fripp inserted a periosteum-covered graft from the sixth rib. A cap splint was used, and notches were cut in the mother bone in which the graft was placed. The bone was partly shot away, and partly lost by necrosis following attempts at plating. The graft was inserted about three months after the injury. The wound healed primarily. The splint was left on for a further five months. Then it was taken off, and, union being firm, a denture was inserted. *Fig.* 84 is from a skiagram taken twelve months later.

Eve also records some cases. He used non-periosteal grafts, following the teaching of Macewen.[5a] It may be noted that Loos, of Frankfurt, who claims to have had good results using non-periosteal grafts, had started a series following Lindemann's technique. His book has not been obtained, but a review of it states that the methods described were similar to Lindemann's. Of 17 bone implantations, 14 healed *per primam*.

Sebileau in France and, indeed, Lindemann, have used the method of sliding or twisting round pieces of bone separated from one or other of the ends of the mandible. The method is only of use when the gap is small. Pont,[13] of Lyons, is of opinion that the reeuperative effort of the upper portion of the ascending ramus is less than that

of the body of the mandible: hence union may fail at this end. He warns against using bone sutures or plates to fix the graft. A case is recorded[3] by W. S. Davenport for which Greenough used a steel plate apparently to fix the ends of the mother bone. It was removed twenty-seven days after the operation—why, is not stated: but attention is called to the absorption which had taken place around the anterior screw, as shown in the skiagram. Three months later abnormal mobility is noted, but at the end of nine months the result is recorded as showing perfect bone-union. Other instances of the use of bone-grafts are described by Hayes[8] in a series of articles on the work at Neuilly. Full details are not given, but the method—paring of the ends of the bones to open the medulla, and the pushing back of the periosteum to be afterwards brought over the joint—simulates Lindemann's procedure.

If, to obtain fixity of the bony fragments, the mandible be wired or otherwise fixed to the maxilla, this may render the giving of a general anæsthetic difficult. At Lyons the splints are fixed, but not fastened together till the day following the insertion of the graft. Eve did a preliminary laryngotomy. Lindemann used novocain, but prefers the mandible to be free to move, believing its physiological movement encourages bone development and the healing of the graft.

Plating of Fractures.

The immediate treatment of fractures by plating is universally condemned, as is the wiring to the bone of metal or vulcanite troughs or frames. Nevertheless, when the effect of the injury has passed and the mucous membrane has healed, so that the oral cavity is not opened during the operation, plates have been used with good results. Schröder states[5] that when no teeth are present, plates are used in Berlin, but no details are given or cases described. Hashimoto[7] used plates in old cases in the Japanese war. They worked loose, but appear to have served their purpose. He fixed the plate on the lingual side of the bone.

Feeding.

The feeding of patients suffering from injuries of the jaw is difficult. At Strassburg, early after the injury the patient is kept sitting in bed: the head is then tipped back, and, by means of a feeding cup, liquid food is dropped on the back of the tongue. This is said to encourage or teach him to swallow. But often feeding must be by a tube carried far back into the mouth, sometimes into the œsophagus, and more rarely through the nose. Even with ability to swallow, the injury disinclines patients to make the effort to take the nourishment essential to recovery. The sameness of Army diet is also said to diminish desire for food. Hence it may be useful to append the diet sheets arranged by Holt for use of the patients in the Croydon War Hospital.[6]

Fluid Diets.—The regulation milk and beef-tea diets contain 12 oz. and 16 oz. of bread respectively; these, being unsuitable, are accordingly modified. For example, arrowroot, cornflour, and semolina are substituted for rice and bread. The men are seldom kept on this diet for more than three or four days.

'*A*' *Diet* (*Semifluid*).—To construct this, the regulation beef-tea and chicken diets are taken as a basis and served on alternate days in various forms.

Day	Breakfast	Dinner	Tea	Supper	Extras
Sunday ..	Egg and milk	Chicken broth, eggs, blancmange, fruit	Rice, milk	Arrowroot, milk	—
Monday..	Milk gruel	Beef-tea, junket	Crumbled bread and milk	Benger's food	—
Tuesday	Crumbled bread and milk	Rice, soup, custard	Sago, milk	Cocoa, jelly	—
Wednesday	Arrowroot, milk	Savoury, custard, sago pudding	(Wheatmeal) flour gruel	Crumbled bread and milk	—
Thursday	Porridge with syrup (or sugar) and milk	Chicken broth, apple custard	Rice, milk	Coffee, jelly,	—
Friday ..	Egg and milk	Beef-tea with oatmeal, milk, jelly	Crumbled bread and milk	Arrowroot, milk	—
Saturday	Crumb'ed bread and milk	Chicken broth, arrowroot, soufflé	Benger's food	Egg, jelly	—

The articles required are:—

Sunday.—Milk 4 pints, eggs 2, arrowroot 1 oz., sugar 6 oz., chicken 1 quarter, apples 1 lb., cornflour 1 oz., salt and pepper.

Monday.—Milk 4 pints, oatmeal 1 oz., rennet 2 teaspoonfuls, beef ½ lb. bread 4 oz., Benger's food 4 oz., sugar 4 oz., salt and pepper.

Tuesday.—Milk 4 pints, bread 4 oz., rice 2 oz., sago 1 oz., cocoa ¼ oz., eggs 2. chicken 1 quarter, sugar 4 oz., gelatin ½ oz., salt and pepper.

Wednesday.—Milk 4 pints, arrowroot 1 oz., beef ½ lb., wheatmeal 2 oz., bread 4 oz., eggs 2, sugar 4 oz., salt and pepper.

Thursday.—Milk 4 pints, chicken 1 quarter, oatmeal 2 oz., golden syrup 1 oz., eggs 2, apples 1 lb., coffee ½ oz., gelatin ½ oz., sugar 6 oz., rice 2 oz., salt and pepper.

Friday.—Milk 4 pints, beef ½ lb., oatmeal 1 oz., bread 4 oz., egg 1, gelatin ½ oz., arrowroot 1 oz., sugar 4 oz., salt and pepper.

Saturday.—Milk 3 pints, chicken 1 quarter, eggs 4, lemons 2, Benger's food 2 oz., sugar 5 oz., arrowroot 1 oz., gelatin 1 oz., bread 4 oz., salt and pepper.

'*B*' *Diet* (*Minced*).—This is a minced ordinary diet, simpler to prepare than the 'A' diet. Extras are allowed for breakfast, but tea and supper contain only articles allowed in the ordinary diets.

Day	Breakfast	Dinner	Tea	Supper	Extras
Sunday	Eggs, tea, bread and butter	Beef, O.D., milk pudding	O.D.	O.D.	2 eggs, milk pudding, 1 pint cocoa
Monday	Porridge, O.D.	Mutton, O.D. milk pudding	,,	..	2 eggs, milk pudding, 1 pint tea
Tuesday	Sausages, O.D.	Beef, O.D., milk pudding	,,	..	3 eggs, 1 oz. butter, milk pudding, 1 pint cocoa
Wednesday	Eggs,O.D.	Mutton, cream, milk pudding	..	..	3 eggs, ½ pint milk, 1 oz. butter, milk pudding, 1 pint tea
Thursday	Eggs,O.D.	Beef, O.D. milk pudding	..	..	2 eggs, milk pudding, 1 pint cocoa
Friday	Porridge	Mutton, O.D., milk pudding	..	..	2 eggs, milk pudding, 1 pint tea
Saturday	Eggs,O.D.	Rabbit, O.D., milk pudding	..	..	2 eggs, milk pudding, 1 pint cocoa

Jam and marmalade may be added to the tea diet, or cocoa substituted for tea.

'*C*' *Diet* (*Stewed*).—In this the object is to bring into work the muscles attached to the jaws without too much strain on the newly-joined fracture.

Day	Breakfast	Dinner	Tea	Supper	Extras
Sunday	O.D. with toast, bacon	O.D., beef, milk pudding	O.D. (with toast). jam	O.D. (with toast). cocoa	2 oz. bacon, 1 oz. jam, 1 pint cocoa, milk pudding
Monday	O.D., porridge	Mutton, O.D., milk pudding	O.D., marmalade	O.D., tea	1 pt. porridge, 1 oz. marmalade, 1 pint tea, milk pudding
Tuesday	O.D., sausages	Beefsteak pudding, O.D., milk pudding	O.D., jam	O.D., cocoa	2 sausages, 2 oz. flour, 1 oz. suet, 1 oz. jam, 1 pt. cocoa, milk pudding
Wednesday	O.D.,eggs	Mutton broth, O.D., milk pudding	O.D., marmalade	O.D., tea	3 eggs, 1 oz. marmalade, 1 pint tea, milk pudding
Thursday	O.D., kipper	Exeter stew, O.D., milk pudding	O.D., jam	O.D., cocoa	1 kipper, 1 oz. suet, 2 oz. flour, 1 oz. jam, 1 pint cocoa, milk pudding
Friday	O.D., porridge	Mutton, O.D., milk pudding	O.D., marmalade	O.D., tea	1 pt. porridge, 1 oz. marmalade, 1 pint tea, milk pudding
Saturday	O.D., herring or bloater	Rabbit, O.D., roly-poly pudding	O.D., jam	O.D., cocoa	1 herring or bloater, 1 oz. suet, 2 oz. flour, 2 oz. jam, 1 pint cocoa

'*D*' *Diet* (*Boiled and Roast*).—This consists of the ordinary diet of military hospitals as set forth in the regulations. It is a common experience for a man on 'C' diet to have to go back to 'B' diet or from 'B' to 'A.' At this period the jaws should have real work to do. A man may not be discharged from hospital until he is on ordinary diet.

We are indebted to the *British Dental Journal* for most of the figures illustrating this paper, to the *British Journal of Surgery* for *Figs.* 61, 63, and 72, to the *R.A.M.C. Journal* for *Fig.* 80. *Figs.* 66, 69, 70, 78 are redrawn from *l'Odontologie*.

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JOINTS, SURGERY OF. (*See also* Arthritis.)

W. I. de C. Wheeler, F.R.C.S.I.

It appears to be fairly well established that *drainage of a septic joint* is not advisable as a normal procedure; thus most cases of metastatic arthritis can be cured by heavy weight-extension and repeated aspirations, followed by the injection of 2 per cent formalin and glycerin solution (Medical Annual, 1916, p. 340). The injection of ether has been advocated, but in a few instances was followed by sloughing of the synovial lining.

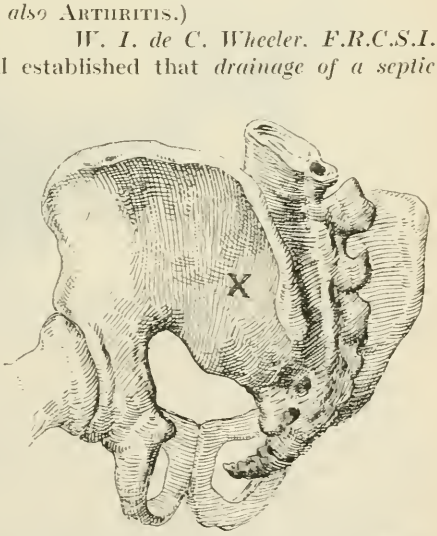

Fig. 85.—Showing method of access in disease of the sacro-iliac joint (Wheeler). X marks the position on the bony pelvis for the application of the trephine or drill to expose the sacro-iliac joint.

In severe cases of sepsis such as follows gunshot injuries, amputation may be avoided by free **Resection** of the joints, in order to establish efficient drainage. Fullerton and others point out that the knee-joint, for anatomical reasons, cannot be satisfactorily

drained, and recommend as a preliminary the removal of the end of the femur and the upper portion of the tibia. In this way only can virulent sepsis be combated in cases which otherwise call for amputation. Unlike the classical excision of the knee, the bones are kept apart until, by drainage and irrigation, the infection is subdued. Resection of the shoulder-joint under similar circumstances gives equally good results, and, in the case of the ankle, removal of the astragalus is probably the best procedure.

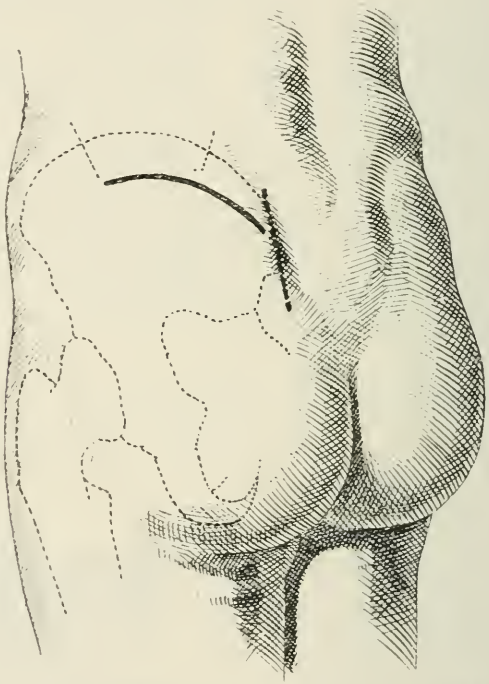

Fig. 86.—Method of access to sacro-iliac joint. The black line shows the best line of incision, the mid-point of which corresponds to the junction of the posterior third with the anterior two-thirds of the iliac crest. The vertical dotted black line shows faulty approach to the joint.

According to Burckhardt and Langois,[1] resection in the case of the hand, foot, and elbow gives good results. In the case of the knee the general results are poor, and although the limb is preserved a false joint usually results.

In infected hip-joints the casualties are very great, and resection very rarely saves the life of the patient. W. H. Deaderick[2] discusses the treatment of *sacro-iliac arthritis*. He points out that, like most other forms of arthritis, sacro-iliac disturbance is usually secondary to a source of infection elsewhere in the body, e.g., the prostate or the gums. The first aim in the treatment should be, therefore, to locate

and, if possible, remove the primary focus. Vaccines or prostatic massage may be necessary or, as in a case the author reports, the administration of emetine for alveolar pyorrhœa. The treatment of this joint, however, should not differ from that of septic arthritis of other joints, except that here aspiration, injection, and extension are not practicable. Ready access can be obtained to a septic focus in the manner illustrated in *Figs.* 85-87.[3]

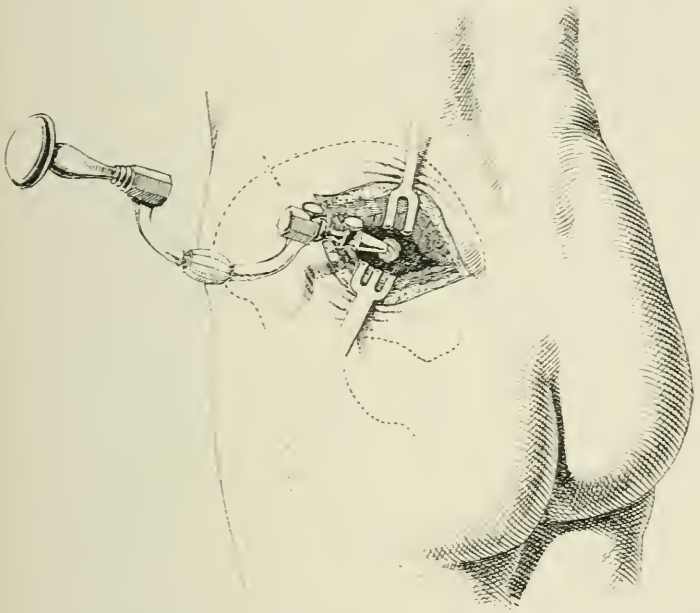

Fig. 87.—Method of access to the sacro-iliac joint (Wheeler). Drill (directed slightly backwards) applied to the bone midway between the sciatic notch and the iliac crest. (*Figs.* 85-87 *redrawn from the 'British Medical Journal.'*)

For treatment of painful joints by **Keritherapy** (*see* p. 20). Synovitis and sprains by **Calendula** (p. 13); tuberculous arthritis by **Garlic** (p. 19); and the use of **X-rays** in diagnosis (p. 44).

References.—[1]*Surg. Gyn. and Obst.* 1916, July; [2]*Lancet Clinic*, 1916, May; [3]*Brit. Med. Jour.* 1912, ii, 879.

KALA-AZAR. (*See* Leishmaniasis.)

KIDNEY, DISEASES OF. (*See* Nephritis.)

KIDNEY, SURGERY OF. *J. W. Thomson Walker, M.B., F.R.C.S.*

Burns[1] advocates the use of **Thorium Solution** for *pyelography*. Some of the salts of thorium were, in experimental work, found to be irritating, and a solution containing a double citrate of sodium and thorium, together with an excess of sodium citrate and some sodium

nitrate, was found to be a non-toxic, non-irritating fluid, which threw a heavy shadow and did not stain linen. For the method of preparation see p. 43.

Payne[2] records a case of *essential hæmaturia* where the only part of the kidney which showed pathological changes was the papillary area. Microscopically, the cortex and medullary portions were normal, while the papillæ showed the following lesions: (1) Numerous microscopic calculi; (2) Overgrowth of connective tissue; (3) Hugely dilated capillaries; (4) Calculi lying in close apposition to dilated capillaries; (5) Dilated capillaries in a network on the free surface of papillæ, many of which are ruptured, with free blood escaping.

In an article on the surgical replacement of the *prolapsed kidney*, Bissell[3] describes in detail the technique he has adopted. The fascial capsule of the kidney is incised, and the fatty capsule separated. A crescentic incision is made through the capsule on the posterior surface of the kidney, commencing on the convex surface near the upper pole, and passing within 1 cm. of the hilium, to the convex surface near the lower pole. Two sutures of silkworm gut, kangaroo tendon, or chromic gut are now passed round the upper and lower poles of the kidney, passing through the free portion of the fibrous capsule and the convex border, across the anterior surface, dipping through the capsule, round the inner concave border, and finally through the attached portion of the fibrous capsule on the posterior surface. Three or more small catgut sutures penetrate the margin of the freed fibrous capsule. The inner ends of the sustaining sutures are now passed in the upper angle of the wound, through the lumbar muscles, to the inner side of the last dorsal nerve, and not through the skin. The outer ends are passed through the muscular tissue immediately below the twelfth rib and through the skin. The catgut sutures attached to the fibrous capsule are now anchored to the under surface of the lumbar fascia, near its cut edges. The wound is closed, and the sustaining sutures are tied over a roll of iodoform gauze, the lower suture being tied first, so as to elevate the kidney. These sutures are removed on the nineteenth day, and the patient gets up on that day.

According to Gilpatrick[4] it is unnecessary and unwise to attempt fixation of a *movable kidney* exactly in its normal position. A kidney one inch lower than its supposedly normal level is still within its anatomical niche. In discussing treatment, the author holds that it is permissible to make use of the fibrous capsule as a support for the kidney, but any wounding or constriction of kidney substance must be avoided. He commits himself to the opinion that "the employment of any technique which involves transfixion or compression of any considerable amount of kidney substance, in order to immobilize the organ, is a frank removal of that organ so far as functional activity goes, is an admission of inability to cure the wanderer other than by destruction, and is little, if any, to be preferred to an elective nephrectomy." Holding these views, he favours a method of incising and stitching the capsule, which he describes in detail.

Simple subparietal rupture of the kidney is discussed by Connell,[5] who concludes: (1) Shock, injury to other organs, and external evidence of trauma, are frequently absent in subparietal rupture of the kidney; (2) History of abdominal contusion, followed by tenderness, rigidity, and hæmaturia, is sufficient to lead to a diagnosis of kidney injury; (3) Slight lesion and serious rupture of the kidney may not be differentiated by clinical signs or symptoms; (4) Exploratory incision will reveal the nature and the extent of the injury; (5) Proof that there is absence of a serious rupture is called for before instituting the so-called expectant treatment; (6) Nephrectomy should be reserved for very extensive injury of the organ, or for late cases. Stanley[6] records a case of rupture of the kidney, with intraperitoneal hæmorrhage, which recovered under non-operative expectant treatment.

Gunshot injuries of the kidneys are somewhat rarely seen, partly because the position of the organ protects it in abdominal injuries, and partly because when the injuries affect the kidney the patient dies on the field. Lichtenstein[7] has observed 21 cases of injury to the kidney: 8 of bullets passing through the kidney, 4 of gunshot injury with other complications, 1 of stab wound, and others from violence, such as falls, kicks, etc. Four were operated upon, and the rest recovered under expectant treatment. One patient died. Hæmaturia and local pain are the cardinal symptoms. The kidney is usually enlarged from subcapsular hæmaturia. Infiltration of urine, if it occurs, is palpable in the kidney region. Extensive hæmorrhage may push the kidney up against the diaphragm, so that it cannot be distinguished from a hæmaturia. Before operation, the presence of an active second kidney should be ascertained by means of the ureteric catheter. The most serious complication is infiltration of urine, and this is comparatively rare. It occurred 3 times in the author's 21 cases. The prognosis is usually good. It depends upon the extent of the injury, complication in other organs, and secondary infection. When the bullet has passed through the kidney, and there is no great amount of hæmorrhage, expectant treatment is indicated. The author recommends horse serum as a hæmostatic. If there is severe hæmorrhage, or urine infiltration, operation is indicated. (*See also* ABDOMEN, PENETRATING WOUNDS OF.)

Braasch[8] reviews 101 cases operated on for *abscess in the perinephric tissue*, 67 of these being true perinephric abscesses. The causative factors, in order of frequency, were pyonephrosis, renal tuberculosis, nephrolithiasis, cortical abscess, and traumatic abscess. None were found to have originated from a primary pyelitis or pyelonephritis. In 18 cases, no evidence of renal involvement was found on clinical examination. Of the 67 cases, 2 died as the result of operation, and 3 within three months; in 18 the wound healed within one month; in 25 there was a fistula from two to six months, and in 4 the fistula persisted.

Bland-Sutton[9] discusses the fate of patients who have had stones

removed from the kidney. After removal of a disorganized kidney, if the other is healthy, a man may live as long with one kidney as another with two; but often his existence is precarious. At any time the ureter of the remaining kidney may be blocked by a stone. The risks of recurrence after nephrolithotomy have never been estimated on a large statistical basis. It is probable that sepsis following nephrolithotomy is in many cases responsible for recurrent calculi. Many calculous kidneys are septic at the time of the primary operation. Conservation of a disorganized and septic kidney exposes patients to the risk of future suffering from recurrent calculi. This entails repeated operations and, generally, removal of the kidney under adverse circumstances.

According to Cabot and Crabtree,[10] the simplest and clearest *classification of renal infections* is their division into two main groups: (1) Infection in kidneys having no previous gross lesion, and not part of a general, and in itself lethal, septicæmia; (2) Infection in kidneys having an antecedent gross lesion, such as stone in kidney or ureter, or damage dependent upon obstruction of ureter or bladder. In group (1) there are three distinct types, viz., those due to infection with the coccus group, the colon bacillus group, and the tubercle bacillus. The majority of coccus infections of the kidney are produced by either the *Staphylococcus aureus* or *albus*, less frequently by the *citreus*. The most important characteristic of this type is the tendency to produce subcapsular lesions resulting in perinephric abscess, without causing important damage to the secreting substance of the kidney. There is therefore very little pus in the urine, and very little change in the renal function. The colon bacillus produces little cortical disturbance and little perinephric, except that due to reinfection from the pelvis, much disturbance in the tubules, and marked pyelitis. There is marked pyuria, and a very distinct effect on the renal function. In tuberculosis, there is marked pyelitis, and this affects especially the tips of the pyramids. In the coccus cases, the treatment is surgical. In the acute cases, nephrectomy is usually necessary, and is generally successful. In subacute cases, operation is necessary, but the form it will take depends upon the condition found. The colon bacillus lesions, according to the author, do not require operation, and should be treated with the formaldehyde series of urinary antiseptics. Renal tuberculosis requires nephrectomy.

Crabtree[11] records the end-results of 70 cases of *renal tuberculosis* treated by nephrectomy at the Massachusetts General Hospital. The immediate mortality in 103 cases operated on was 3·8 per cent. This figure includes cases of death as the result of the operation, and taking place in the hospital where the patient is under observation. The causes of death in the 4 fatal cases were pneumonia, pyelonephritis of the remaining kidney, hæmorrhage, and shock. Late mortality is defined as death from tuberculosis, subsequent to temporary recovery from the operation; 14 of the cases of the series (20 per cent) are known to have died from tuberculosis. Of these, 4 died within

three months from tuberculous cachexia, 3 died from genito-urinary tuberculosis and exhaustion, one in the third year and two in the second; 2 died, one in the first year and one in the fourth, of tuberculous meningitis; 5 died from tuberculosis at an average of 3·2 years after nephrectomy. One-half of the 14 cases died during the first year, the other half at an average of 3·3 years. Sixty per cent of the cases were considered cured. Somewhere between 55 to 70 per cent of cases operated upon for unilateral lesions can be considered cured of active tuberculous lesion at the end of five years. There remain, however, in about 35 per cent of the cases, legacies of the disease in abnormal urine and persistent symptoms. Nephritis—probably of toxic origin—and secondary infection of the remaining kidney, irritable bladder, traces of albumin, and slight pyuria are among the commonest permanent effects of the disease. In 10 to 15 per cent the progress of the disease is not checked by nephrectomy. The results of drainage of the wound after nephrectomy compare favourably with undrained wounds, in regard to sinus formation. Approximately 25 per cent heal by first intention, and in 75 per cent sinuses develop irrespective of the method of wound-closure employed.

The treatment of *chronic colon bacillus pyelitis* by **Pelvic Lavage** is discussed by Kretschmer and Gaarde.[12] The cases treated were of chronic pyelitis in which there was no associated organic disease of the kidney, such as stone or tuberculosis. The tests of cure were the disappearance of pus from the urine, and cultures from the urine obtained by ureteral catheter remaining sterile. In order to prevent recurrences, it was essential to remove any focus which might cause relapse. In women, sterile kidney specimens were often obtained long before the bladder urine became sterile. In men, there was frequently associated prostatitis and seminal vesiculitis. As a rule, a solution of silver nitrate of 1 per cent strength was used for the lavage, and the average amount injected was from 5 to 7 c.c. At the same time autogenous vaccines were used, and the urine was turned alternately alkaline with sodium bicarbonate, and acid and antiseptic with sodium acid phosphate and urotropine. Of 21 cases treated, only 14 were followed to a finish. Bacteriological cures were obtained in 11 cases. In the remaining 3 it was possible to obtain positive cultures from the ureters, although subjective symptoms and leucocytes in the urine had long since disappeared. The number of injections varied from one to eight.

An investigation of 34 renal growths by Fraser,[13] with the object of deciding the origin of the growths known as *hypernephromata* of the kidney, showed that in one there was convincing clinical and morphological evidence that it took origin in an accessory nest of cortical adrenal cells. The patient was a female, with pronounced male characteristics. In another, the morphological evidence pointed to the view that the tumour arose from multiple nests of adrenal cortical cells lying in, or around, the capsule of the kidney. In the remaining 32 cases of so-called hypernephromata, the morphological evidence

indicated that the tumours were derived from renal adenomata. Thus it appears that the majority of cases of hypernephroma should be classified as 'nephroma,' and the term 'hypernephroma' should be reserved for malignant tumours arising from cortical adrenal cells. The primary structures of tumours of adrenal origin are essentially different from those of tumours of renal origin, but the primary structures of some renal tumours (adenomata) may, through proliferation changes, imitate those of tumours of adrenal origin. Both tumours may undergo secondary degenerative and malignant changes, which make their histological features very similar; these changes are practically always in the renal tumours, but less frequently in the adrenal.

From a study of 409 reports of *tumours of the kidney*, the source of which is not stated, Denaclara[14] states that hæmaturia occurred in children under ten years in 38·94 per cent of cases, and in adults in 64·88 per cent. In children he found hæmaturia present in 41·3 per cent of malignant, and in 30·3 per cent of non-malignant, growths; while in adults the proportion of patients suffering from hæmaturia was 75·55 per cent in malignant, and 55·81 per cent in non-malignant, growths.

An analysis of symptoms in 59 cases of *malignant growth* of the kidney occurring in the Royal Victoria Infirmary, Newcastle-on-Tyne, is given by Willan.[15] The commonest onset symptom was painless hæmaturia. In 32 cases out of 52, pain, hæmaturia, and a palpable renal tumour were associated at some stage. In 3 cases varicocele was a complication. Two patients had clot-retention of urine. Pyelography was considered an important method of diagnosis, and for accurate observation the renal pelvis on both sides must be injected. It is not apparent that the method was employed in any of these cases.

Paschen[16] records the result of an investigation of the ultimate results of operations on 'Grawitz tumours.' He uses this term in preference to hypernephroma, as there is some doubt regarding the pathological position of these growths. From the literature he collected 268 cases with an immediate death-rate of 19·03 per cent, while 46 patients (17·17 per cent) were alive and well after three years. In Paschen's own service at the Hamburg Hospital, 54 cases have been operated on, of which 6, or 11·11 per cent, died from the operation, while 19, or 35·19 per cent, are alive and well after three years. The results were found to be much better if the operation is done early, and he advises an exploratory incision as soon as hæmaturia appears, if other causes can be excluded.

The results of a study of 157 cases of *stone in the kidney and ureter*, treated in the Massachusetts General Hospital, are published by Cabot,[17] and the following are a few of the points revealed: The greatest number of patients were operated between twenty and forty years of age, but in a large number of cases the symptoms commenced between the ages of ten and twenty. In 127 cases the *x*-ray report was negative, but Cabot considers that in competent hands, at the

present time, the *x* rays fail to detect stone in between 10 and 15 per cent of cases. There were 150 operations, with 5 deaths, or over 3 per cent. In 47 cases of pyelolithotomy there was one death, and in no case did a urinary fistula result. A striking fact was the considerable number of these patients that had been subjected to a previous operation. In 10 cases the appendix had been removed without relief of symptoms, and in 7 there had been an exploratory laparotomy. (*See also* X-RAY DIAGNOSIS.)

Adrenalin for relieving renal colic (p. 12).

REFERENCES.—[1]*Johns Hop. Hosp. Bull.* 1916, June, 157 ; [2]*Surg. Gyn. and Obst.* 1916, ii, 76 ; [3]*Ibid.* 100 ; [4]*Boston Med. and Surg. Jour.* 1916, i, 825 ; [5]*Surg. Gyn. and Obst.*, 1916, i, 663 ; [6]*Lancet*, 1912, ii, 757 ; [7]*Surg. Gyn. and Obst.* (abst.), 1916, i, 322 ; [8]*Ibid.* 649 ; [9]*Lancet*, 1916, ii, 1 ; [10]*Surg. Gyn. and Obst.* 1915, ii, 669 ; [11]*Boston Med. and Surg. Jour.* 1916, i, 780 ; [12]*Jour. Amer. Med. Assoc.* 1916, i, 1093 ; [13]*Surg. Gyn. and Obst.* 1916, ii, 645 ; [14]*N. Y. Med. Jour.* 1915, ii, 1093 ; [15]*Brit. Med. Jour.* 1915, ii, 774 ; [16]*Surg. Gyn. and Obst.* (abst.), 1916, i, 544 ; [17]*Jour. Amer. Med. Assoc.* 1915, ii, 1233.

LABOUR. (*See also* ANÆSTHETICS.) *W. E. Fothergill, M.D.*

Painless Childbirth.—F. W. N. Haultain and B. H. Swift[1] give the most recent and probably the most reasonable and authoritative statement on this subject. They point out that 'the ordinary haphazard **Scopolamine-Morphine** treatment' which has been freely used for the last eight years is a very different thing from a definite technique which aims at securing that the patient shall have no recollection of the labour having occurred. They summarize the Krönig technique as follows :—

"As soon as the pains begin, the patient is put in a quiet and darkened room, and plugs of cotton-wool are put in her ears. When the pains occur regularly every five or six minutes and the os is of a size sufficient to admit two fingers, the initial dose is given. This consists in the hypodermic injection of morphine hydrochloride gr. $\frac{1}{4}$ with hyoscine hydrobromide gr. $\frac{1}{150}$. As a rule the patient rapidly begins to feel drowsy, and in an hour may fall off to sleep, but awakes when the pains come on. The second injection of hyoscine, gr. $\frac{1}{4\,150}$. is usually given at the end of an hour. Half an hour later the patient's memory is tested by showing her some object and then allowing her to sleep. Some time afterwards the same object is shown her again, the patient being awakened. If she recognizes the object as one that was shown her before, another dose of hyoscine gr. $\frac{1}{4\,150}$ is called for; if, however, she does not recognize the object and says it had not been shown her before, then the depth of desired unconsciousness has been obtained. This memory test is repeated later, and, if necessary, similar doses of hyoscine may be required. The patient usually sleeps between the pains, but generally is conscious during them. She does not, however, fully appreciate the pains as such, and, if asked about them, generally describes them otherwise.

"The child is usually born normally, and, after the birth of the placenta, the patient falls into a normal sleep for four to six hours

and awakes quite fresh. During the labour she should be catheterized. This is most important, especially in long labours. Patients very often complain of thirst, and in such cases should have water to drink."

In their early cases they followed this method rigidly. Subsequently they laid less stress on the memory test, using it for the first two or three injections and then giving hyoscine gr. $\frac{1}{150}$ at regular intervals of one hour. This is useful, as the injections can be given by a nurse. The smallest number of injections they found to produce amnesia was four, including the initial dose. The largest number of doses given during a labour was forty-five. The average number of doses was eleven. Success was complete in 75 per cent of their cases, and partial in 13 per cent. In the remaining 12 per cent they consider that there was some analgesia but no amnesia. Delivery was ended with forceps in 35 per cent of the cases, chloroform being administered as a rule. The authors summarize points of special importance as follows :—

" 1. In the case of a primipara the first injection must not be given too early, as it tends to stop the pains. The rule of giving the first injection when the os admits two fingers, and the pains are regular, is a useful one. In the case of a multipara, however, the injections cannot be given too early after the pains have started. It is generally found that the first injection is given too late.

" 2. The second injection, namely, the first $\frac{1}{150}$ gr. of pure hyoscine, should be given about an hour after the initial injection, whether the patient is well under or not. If this injection is delayed, the effect of the morphine tends to wear off, when the future injections of hyoscine will not take effect.

" 3. The injection can with safety be repeated either at hourly or three-quarter-hourly intervals.

" 4. Do not repeat the morphine in the latter part of the second stage, or the child will most probably be born oligopnœic. If the hyoscine is not taking effect, then it is well to give the mother a slight whiff of chloroform ; thus the hyoscine is allowed to work and the patient gets again into the condition of 'twilight sleep.'

" 5. The patient's friends must be kept away from the room, which ought to be quiet and darkened.

" 6. Patients, if thirsty, must be given water to drink.

" 7. The bladder must be catheterized during long labours.

" 8. Remove the baby to another room after birth, so that the mother cannot hear the cries ; otherwise she may remember the cry and so piece together, and so imagine her whole labour."

These writers conclude as follows :—

" From the foregoing experience it may be stated that we have a safe and efficient means of managing labour painlessly in the majority of cases. It requires, however, the constant attendance of a competent attendant. This rôle can be efficiently undertaken by a reliable nurse under supervision, which makes its adoption in better-class private practice possible to the medical practitioner.

"It is of special value in primiparæ, in whom as a rule the first and second stages of labour are long and painful.

"It is also of great value in a prolonged second stage, due to a large head or slightly contracted pelvis, as it allows of head moulding without unduly exhausting the patient.

"So far as amnesia is concerned, it is of little use to commence the treatment during the second stage.

"The strength of the uterine contractions is not diminished: hence its advantage over chloroform. There are no contra-indications to its use beyond extreme restlessness, which is very exceptional and probably due to an idiosyncrasy."

From the perusal of recent papers by other writers we judge that labour is considerably slowed by the use of morphine and hyoscine, whether the strength of each uterine contraction is diminished or not. Several writers recommend the use of pituitrin during the second stage in suitable cases as a method of counteracting the slowing effect of the analgesic drugs. Others continue to terminate labour by the use of the forceps. Some writers state that patients are specially well and free from fatigue after 'twilight sleep,' but our personal observations do not confirm this view. The patients we see generally show the ill effects of narcotic poisoning for some days.

N. S. Heaney[2] adds another testimony to those in favour of **Nitrous Oxide** as an anæsthetic during labour. With a good machine, its administration would not seem to demand more from the attendant than does morphine-hyoscine. It is maintained that neither the intensity nor the frequency of the uterine contractions is lessened by nitrous oxide. If this is so, it is more than can be said for the other anæsthetics and analgesics in use.

Uterine Inertia.—Several papers[3] report on the use of **Pituitrin** during labour. Their fault is that the part played by the drug can only be estimated roughly, and the estimate is a personal impression in each case. It appears that many disasters have followed the use of the drug, and that these have occurred: (1) When too large a dose has been used; (2) When it has been used too early: and (3) When it has been used in unsuitable cases, especially when there has been some degree of mechanical obstruction to delivery. On the other hand, it appears that pituitrin causes good uterine contractions, and may be very useful if given: (1) In proper doses: (2) At the proper time; and (3) In cases where there is nothing abnormal except defective uterine contraction.

1. The dose of 1 c.c. generally given is often needlessly and dangerously large. Good results are secured by some with repeated doses of two or three minims.

2. The proper time for pituitrin in labour is when there is uterine inertia. It may safely be used, for example, in starting uterine action during the induction of premature labour, and during the first stage as well as during the second stage of labour, when uterine action is defective. But it should not be used when the

uterus is acting normally, simply in order to get the labour over more quickly.

3. Every case in which the uterus is contracting normally is an unsuitable one for pituitrin. The one proper indication for the drug is 'uterine inertia.' When a labour is slow, it is not easy to decide whether the delay is mainly due to 'weak powers' or to 'undue resistance.' Until it is decided that there is no 'undue resistance' whatever, pituitrin should not be used.

Eclampsia.—N. L. Knipe and J. Donelly[4] refer to the present treatment of eclampsia as being either operative or expectant. The operative line of treatment has been unduly popular during recent years, to the exclusion of older methods which have been tried and not found wanting. The method in use in the University Maternity in Philadelphia is as follows :—

"**Lavage** of the stomach ; 2 oz. of **Castor Oil** given through the stomach tube ; twenty to thirty minutes' sweat in the **Sweat Cabinet ;** hypodermic of **Morphia,** gr. $\frac{1}{2}$, is given if the convulsions are violent or frequent ; **Hypodermoclysis** after the first sweat, followed by **Proctoclysis** midway between subsequent sweats ; **Venesection** if the systolic blood-pressure is over 180, and more particularly if the diastolic pressure is high ; an initial dose of **Veratrum Viride** (10 min.) followed by nitroglycerin gr. $\frac{1}{100}$ at four-hour intervals. **Puncture of Membranes,** if pregnant or in labour, and abstention from any operative interference to hasten delivery, which we find is spontaneously terminated in from eight to ten hours from the institution of treatment."

The result has been 14 deaths in 83 cases, i.e., a mortality of 16·8 per cent, which the authors consider to be better than the results of any radical operative treatment with which they are acquainted. They give details which show that their series included at least the usual proportion of severe cases.

Perineal Tears.—The making of cuts, one on either side of the vaginal outlet, in order to prevent tearing of the perineum, was suggested by Ould in 1742, and was pushed by various writers in the last quarter of the nineteenth century. As primary perineorrhaphy became common, episiotomy dropped out of use. Two writers have recently recommended its revival. These are John Phillips[5] and J. T. Williams.[6] Phillips points out a fact that is generally ignored, namely that most perineal tears are Y-shaped, and consist of two bilateral tears of the vaginal wall running up the sulci and united at their lower ends by a transverse tear separating the middle portion of the vaginal wall from the superficial perineal structures. Into this transverse portion of the tear runs the perineal tear proper—a median laceration of the skin and the perineal body. Two clean cuts, one on either side, are considered preferable to the natural laceration. Phillips has done **Episiotomy** 156 times in the last fifteen years, with the best results.

Williams gives the anatomy of the parts, and says the edge of the

levator ani should not be cut. [We should hope not, as it lies an inch or more above the introitus vaginæ.—W. E. F.] He indicates that the incision for episiotomy after dividing skin and vaginal wall should cut only the superficial structures which compose the perineum proper, i.e., fibrous tissue, sphincter vaginæ, and transversus perinei. It should be behind the duct of the gland of Bartholin.

After-treatment of Perineal Wounds.—E. B. Young[7] recommends that after twenty-four hours, when the bleeding has ceased, the usual perineal pad be omitted, and the fissure between the buttocks be kept liberally covered with a drying and antiseptic powder. The best powder for the purpose is said to be a mixture of **Boric Acid** and **Stearate of Zinc.** This combination keeps the parts dry, though the powder itself gradually becomes moist. The patient lies upon a small pad which may be changed whenever necessary. The parts are washed after urination and defæcation as usual. The method is not new, but it has not been generally used, though it has many advantages, including economy, comfort, saving of trouble, and an increased percentage of cases that heal without suppuration.

References.—[1]*Brit. Med. Jour.* 1916, ii, 513; [2]*Med. Rec.* 1916, i, 995; [3]*Dublin Jour. Med. Sci.* 1915, ii, 241, *Surg. Gyn. and Obst.* 1915, ii, 659, *Western Med. News*, 1916, i, 123, *Ibid*, 80; [4]*Amer. Jour. Obst.* 1916, ii, 63; [5]*Lancet*, 1915, ii, 1186; [6]*Boston Med. and Surg. Jour.* 1915, ii, 946; [7]*Ibid.* 1916, i, 651.

LACHRYMAL DUCT, DRAINAGE OF. *J. S. Fraser, M.B., F.R.C.S.*

In the removal of the anterior ethmoidal cells for ethmoiditis or for gaining access to the nasofrontal duct, Mosher[1] advocates curetting strongly forward until the instrument is stopped by the posterior edge of the ascending process of the superior maxilla. On examining anatomical specimens so operated on, he noticed that in many of them the posterior half of the nasal duct was laid bare. This observation led him to think that the nasal duct could be approached in this way, opened, and drained. By this method the duct is reached through soft tissues instead of through hard bone.

Mosher begins with a description of the anatomy of the region involved. He particularly mentions the unciform fossa, which is bounded posteriorly by the posterior edge of the unciform process, anteriorly by the posterior edge of the ascending process of the superior maxilla, superiorly by the inward swelling made by the unciform process, and inferiorly by the upper rim of the inferior turbinate. When stripped of mucous membrane, the floor of the fossa is seen to be made by the lachrymal bone below and in front and the unciform process behind. In this region the nasal duct comes to the surface behind the ascending process of the superior maxilla. The posterior inferior corner of the fossa is membranous, and this membranous area lies about 1 cm. in front of the ostium of the antrum and in a line with it.

Mosher also describes the unciform or lachrymal cell which occupies the space between the upper part of the unciform process

and the corresponding portion of the lachrymal bone. The uncifonn process, owing to its pronounced inward bulge, makes the upper, the posterior, the inferior, and the inner wall of the cell. The outer wall is made by the upper half or two-thirds of the lachrymal bone. The cell extends the whole width of this bone, and comes into relationship with the upper half of the lachrymal sac.

Mosher prefers general anæsthesia. The anterior end of the middle turbinal is removed, and as much as possible of the superior overhang taken away. The uncifonn process should be fully exposed. These procedures may be done under cocaine anæsthesia as a preliminary. The lachrymal punctum and canaliculus are slit to admit the introduction of Mosher's stiff probe, which is carried through the duct into the inferior meatus. An incision is made with an angled knife along the posterior edge of the ascending process of the superior maxilla, beginning at the level of the anterior attachment of the middle turbinal. The incision is carried downward and slightly backward parallel to the edge of the ascending process of the superior maxilla, and stopping at the upper border of the inferior turbinate. From the bottom of the vertical incision a horizontal cut is now made along the upper rim of the inferior turbinate for about half an inch. From the top of the vertical incision a second horizontal incision is carried backwards across the upper limit of the lachrymal fossa. If this fossa is shallow, it is easy to raise the flap which has been outlined. If it is deep, elevation is more difficult. The flap is next tucked backward and downward. The inner wall of the lachrymal cell is opened with the curette. The instrument is carried outward toward the lachrymal bone into the cavity of the cell, and then brought forward against the posterior border of the ascending process of the superior maxilla. The stiff probe in the lachrymal duct is slowly withdrawn, at the same time making pressure inwards with its point. As soon as the point escapes from the upper rim of the inferior turbinate, it breaks through the inner wall of the nasal duct into the uncifonn fossa. The point of the probe is now advanced a little into the nasal cavity, and then swung strongly forward. It thus lays open the inner wall of the nasal duct from the inferior turbinate into the lachrymal sac. The probe is reintroduced while the operator curettes along the whole length of the posterior surface of the ascending process of the superior maxilla with a small right-angled curette. This removes spicules of lachrymal bone clinging to the open inner wall of the duct, as well as fragments of the upper part of the uncifonn process. The probe is now withdrawn, and the bed of the nasal duct widened by biting away the anterior part of the inner wall of the canal, i.e., the lip of the ascending process of the superior maxilla. A ligature on a special carrier is now passed from the nose out through the slit punctum. To the nasal end of the ligature a small piece of gauze is attached, kite-tail fashion. The plug should be large enough to hold the flap of mucous membrane firmly in place after it has been smoothed into position. Traction on the eye end of the ligature

draws the plug into place. A small piece of adhesive plaster is used to hold the upper end of the ligature to the skin of the forehead and the lower end to the cheek.

When the operative reaction has subsided, the nasal duct is probed at intervals until the mucous membrane of the unciform fossa has healed in place and the tendency to narrowing has been overcome.

Horgan,[2] to obtain more room, starts the operation on the tear sac by resecting the anterior portion of the quadrilateral septal cartilage. In a few cases the anterior end of the middle turbinal must be removed. He never slits the canaliculus, as he finds that dilatation of the punctum permits the use of the lachrymal syringe for cleansing and anæsthetizing, and also allows of the introduction of the sound. It is advisable to remove a large portion—relatively speaking—of the inner wall of the sac. Horgan has ceased to employ West's forceps, as he found them to be clumsy. He now bulges the wall of the sac inwards tent-wise with the sound, and, having incised the wall anteriorly in a vertical direction with a sharp scalpel, completes the removal of the inner wall of the sac with fine curved scissors or the angular forceps of Hartmann. In two of Horgan's cases the lachrymal trouble was found to be complicated by lupus of the nasal cavity. The affected mucous membrane was removed or curetted, and then cauterized with trichloracetic acid. The results were excellent. In three cases, two of which were complicated by external fistula, a previous effort to extirpate the sac had failed.

References.—[1]*Laryngoscope*, 1915, 739: [2]*Jour. Laryngol. Rhinol. and Otol.* 1916, June.

LARYNX, DISEASES OF. *J. S. Fraser, M.B., F.R.C.S.*

Lupus.—Stimson[1] remarks that some hold that the term 'lupus' should be dropped from our nomenclature. Lupus of the larynx, however, differs so in its clinical aspects from the common form of tuberculosis, which is practically always secondary to a pulmonary lesion, that for practical purposes it would seem expedient to retain the term. It usually occurs between the ages of fifteen and thirty. It is claimed by some that lupus of the pharynx and larynx is always secondary to a primary lesion of the nose. Patients with lupus are very apt to become phthisical, but those with phthisis do not as a rule tend to develop lupus.

Papilloma.—Hubbard[2] records several interesting cases of this troublesome condition. He holds that curetting from below through a tracheotomy opening is to be recommended, as one has the firm cricoid ring to curette against. It is necessary, however, to guard against hooking in the tip of the arytenoids. Hubbard does not favour the treatment of papilloma by tracheotomy alone without operation, as it is difficult to re-establish normal laryngeal respiration. He compares this perverted action of the larynx in tracheotomy cases with that found in habitual mouth-breathers, in whom the alæ nasi are closed during inspiration and in whom the habit of mouth-breathing

becomes permanent even though the nasal passages are made perfectly clear. Hubbard advises massage of the larynx to prevent recurrence of the growths. This treatment, combined with hot fomentations followed by cold applications, should be begun some weeks before operation on the larynx.

Malignant Disease.—Lambert Lack[3] believes that the operation of **Thyrotomy** may be greatly improved in all cases by the removal of a portion of the laryngeal cartilages. He says that splitting the thyroid cartilage and pulling aside the two halves gives a very poor view of the interior of the larynx. Through the small opening it is almost impossible to arrest the bleeding with pressure forceps. His method is as follows: The larynx being exposed and tracheotomy performed, the larynx is opened by a median incision, just as in thyrotomy. Retractors are inserted and the two halves of the larynx pulled apart. This should be done gently, just enough space being obtained to see clearly into the interior of the larynx to ascertain the upper and lower limits of the disease. The perichondrium is stripped off the outer surface of the thyroid cartilage as far up and as far back as it is desired to remove the cartilage. Transverse incisions are now made with cutting pliers or strong scissors, dividing the cartilage and the mucous membrane of the larynx at one cut. These incisions are made as high above and as far below the growth as is considered necessary. As they are carried backwards, the flap marked out is easily retracted, and permits a good view of the interior of the larynx. Thus, when the posterior end of the cord is reached and the posterior incision has to be made, a very free view is obtainable. The thyroid cartilage

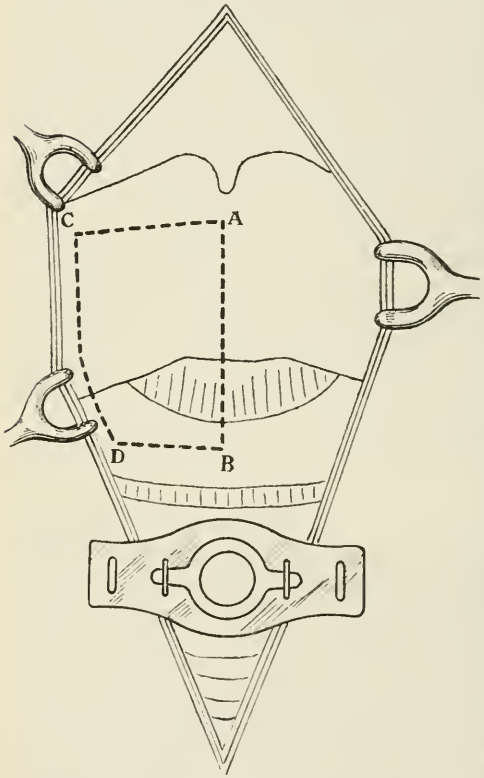

Fig. 88.—Shows the tracheotomy tube in position, and indicates the lines of incision in the thyroid and cricoid cartilages A, B, C, D, in a case of malignant disease involving the whole of one vocal cord.

is divided in the line of the posterior incision, thus removing growth, cord, and underlying cartilage in one piece. If the cartilage is ossified and very hard or brittle, this transverse posterior cut can be made earlier in the operation. It should be made with a small saw or a strong knife, and the soft parts underlying it should not be cut. All bleeding and oozing being arrested, the perichondrium detached from the removed cartilage is united to the opposite cartilage.

The great advantages of this method result from the easy access it provides. The operation can be carried out rapidly. All bleeding points may be controlled with pressure forceps in the usual way. In a proportion of cases the difficulty in swallowing, due to the forcible separation of the halves of the larynx, is serious, and tube-feeding for a few days, a week, or even ten days, is necessary. Healing is rapid, as all the cartilage which has been bared of perichondrium has been cut away. The after-results are excellent; the voice is good, and returns even more quickly than after thyrotomy.

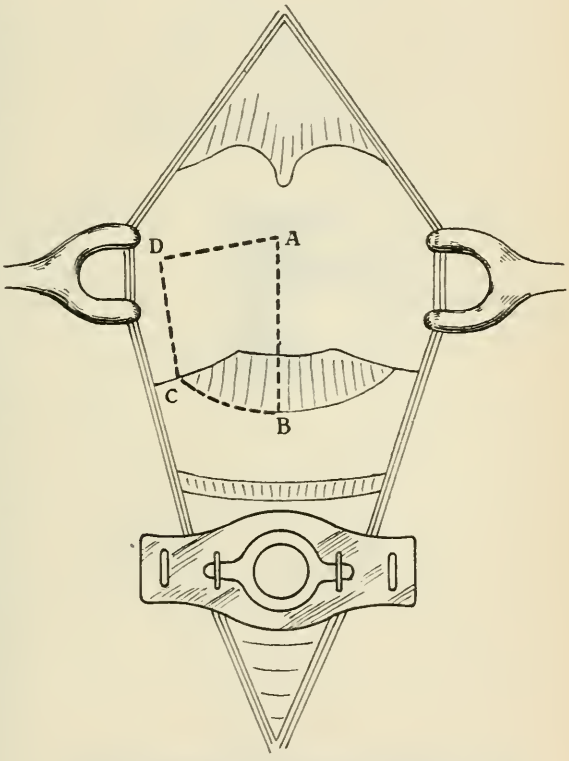

Fig. 89.—Shows the lines of incision in the cartilage in a case in which only the centre of the right vocal cord is affected.

Where the growth is small and known to be limited to the centre of one cord, a median incision is made through the anterior commissure, almost, but not quite, up to the thyroid notch. From either end of this cut, two transverse incisions are next made, one through the cricothyroid membrane as close to the cricoid cartilage as possible, and the other backwards through the ala of the thyroid almost to its posterior edge. The quadrilateral flap being retracted, a view of the interior of the larynx can be obtained and the exact limits of the growth ascertained. These transverse incisions can be carried back as far as is considered necessary, and the 'window' flap retracted more

and more until the posterior incision is made and the growth removed. In this way the growth attached to the cord, with a sufficient margin of healthy tissues, and the cartilage underlying it, are removed in one piece without doing thyrotomy at all.

If a growth be situated in the anterior commissure, a piece of the upper part of the cricoid ring is removed by a semicircular transverse cut. The larynx is opened by deepening the incision and continuing it through the cricothyroid membrane. By turning up this flap a peep into the larynx can be obtained, and the incision gradually extended upwards and around, but well wide of, the growth. This operation is a little difficult, but the growth is removed in one piece without cutting into it. The risk is that if too much cartilage is removed there may be subsequent stenosis of the larynx, and when a considerable portion of both cords is removed, there is always this danger. When the growth extends low down, half the cricoid ring can also be removed.

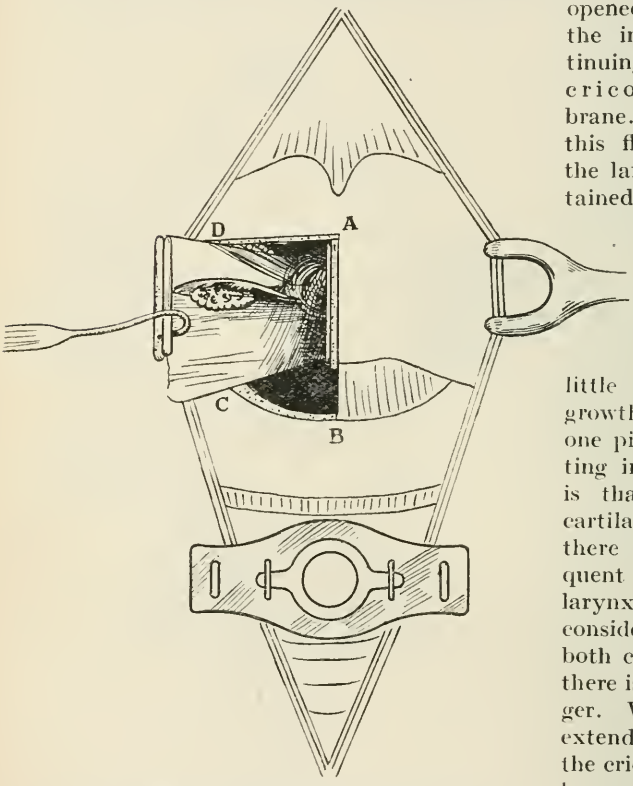

Fig. 90.—Shows the view of the right vocal cord obtained on retracting the flap mapped out in *Fig.* 89.

Stenosis in Children after Intubation and Tracheotomy.—Logan Turner[1] describes seven such cases. In certain acute affections of the larynx (diphtheria and typhoid fever), severe inflammatory changes may occur of such a nature as to produce subsequent atresia or actual stenosis. In both there is the tendency to a necrotic process; ulceration and abscess formation, and necrosis of cartilage, may lead to marked narrowing of the airway and to cicatricial changes causing permanent obstruction. Of the total 34 cases collected by Turner, 18, or 52 per cent, were due to diphtheria, and 16, or 47 per cent, were cases of laryngitis of other origin.

The inflamed and œdematous mucous membrane is naturally vulnerable, and the pressure of an intubation tube must necessarily be a cause of further irritation.

From 1906 to 1915, 268 intubations were performed for acute laryngeal obstruction in the Edinburgh Fever Hospital. Only five of the cases subsequently developed stenosis of the larynx. The percentage of intubation cases which develop subsequent stenosis varies from 0·1 to 6; as a rule it is about 1. The injury which the inexperienced operator may produce affects, as a rule, the upper aperture of the larynx and the structures above the rima glottidis. Occasionally a false passage has been made through the cricothyroid membrane. Even in the hands of the experienced operator, ulceration of the mucous membrane may develop consequent upon the pressure of the intubation tube. If superficial, cure will take place without producing any permanent damage; but if the ulceration extends deeply, subsequent changes will lead to cicatricial contraction. The ulcer or ulcers have their seat of election in the region of the cartilaginous cricoid ring. Here the larynx is narrow. The mucous membrane in this situation can be somewhat readily detached from the deeper structures; consequently the production of œdema is rendered more easy. Ulceration occurs more frequently in young children.

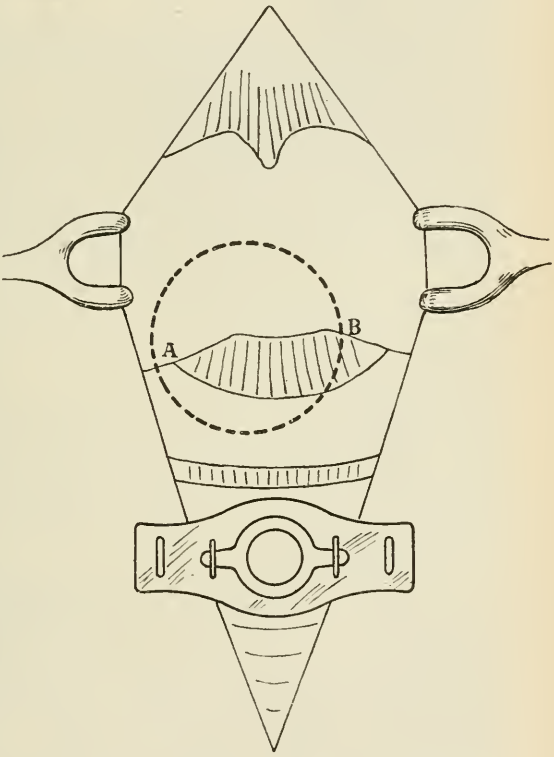

Fig. 91.—Shows the lines of incision in a case in which the malignant growth is situated in the anterior commissure.

Ker says, "The psychological moment for removing the intubation tube is from two and a half to three days from its insertion. If there is still pyrexia, and the breathing is rapid, the tube will often have to be replaced, sometimes in a few minutes, sometimes after a couple of hours. It is rare for a patient who has breathed satisfactorily for as

long as four hours to require a second intubation. Should, however, the tube be re-inserted, an attempt should be made to remove it every second day. The greatest number of re-intubations which I have performed in any one case is fourteen, and the patient in question recovered satisfactorily." Cases in which stenosis occurs are usually those in which intubation has had to be repeated on numerous occasions, and in which the tube has been worn for a long time. The degree of virulence of the primary laryngeal inflammation is also an important factor.

Ker uses the perfected O'Dwyer tube in vulcanite, but occasionally alternates it with the Bayeux metallic tube. The vulcanite is less liable to injure the mucous membrane.

In the majority of the cases of obstruction following intubation, tracheotomy has been found necessary in order to save the patient from further respiratory difficulty. It is possible that the prolonged use of the tracheotomy cannula may assist in consolidating the changes already present, and, by stimulating the development of granulation tissue, increase the area of cicatricial stenosis.

The formation of a superficial decubital ulcer is probably a not infrequent event where intubation tubes are employed. Bokai in 156 autopsies found evidence of this in every case at the level of the cricoid ring and the first two rings of the trachea, in 145 cases on the anterior wall of the canal, in 6 on the posterior wall, and in 5 in both situations. The degree of ulceration varies considerably: there may be either simple epithelial desquamation, ulceration denuding the cartilage, or ulceration and necrosis of cartilage. The superficial ulcerations will cure, while those of a more serious nature lead to cicatricial tissue-formation with incomplete or complete stenosis of the respiratory lumen.

Turner records two cases in which respiratory difficulty followed the removal of the cannula after tracheotomy. Of these the first may be noted. A girl, age 2½ years, had diphtheria. Tracheotomy was performed. The tube was worn for six days and then removed, but there was occasional stridorous respiration six weeks after her recovery from diphtheria. The child's voice was normal. Three days later the child was 'black in the face,' and evidently dying from asphyxia. The old tracheotomy wound was reopened. A pinkish, soft, polypus-like growth partly filling the lumen was seen to project downwards into the upper part of the tracheotomy wound. Its attachment was found on the right side of the tracheal wall just below the cricoid cartilage. It was removed with scissors, and the child made an uninterrupted recovery, there being no further respiratory difficulty.

Falsetto Voice.—Hallock[5] gives the case of a male, age 35. In speaking he used the falsetto voice, and had never spoken in the normal register. Hallock took him to the piano; he could not sing a tune correctly, nor even a single note; he sang them in falsetto. Hallock asked him to clear his throat, and on his doing so, heard the man's natural voice. The patient was requested to cough and clear

his throat again and again, and Hallock got him to accentuate the second part of the cough, and then to divide this cough-clearing process into two parts, much as if he were to say 'a-hem.' He finally produced out of this second sound a good full tone in the normal register. In speaking, he still lapsed into the falsetto. On the day following he was able to produce the normal register tone when carefully guided to it, though the voice still broke. Hallock practised with him from one note to another until he got a range of an octave in the normal register. The patient said that the new voice sounded strange to him. Hallock got him to speak by first singing a simple word and then speaking it in a singing tone, and then gave him some simple exercises, spoken on a full breath and in a 'bold bad man' sort of way, and told him to practise at the piano at home. On the fourth day Hallock asked him to read three or four verses of Longfellow. He did it without a break. In about a week his normal voice was thoroughly established, a good manly baritone. A couple of months later, on being asked to speak again in the old way, he was unable to utter a sound in the falsetto.

References.—[1]*Laryngoscope*, 1916, 49 ; [2]*Ibid.* 1915, 652 ; [3]*Jour. Laryngol. Rhinol. and Otol.* 1916, Apr. ; [4]*Ibid.* Aug. ; [5]*Med. Rec.* 1916, i, 154.

LEISHMANIASIS. *Sir Leonard Rogers, M.D., F.R.C.P.*

J. W. Cornwall and H. M. La Frenais[1] have studied cultures of the Leishman-Donovan parasites of kala-azar as a means of diagnosis and from the point of view of infection. They obtained cultures from the peripheral blood in seven consecutive cases in which kala-azar had been diagnosed or suspected. A dozen Novy-MacNeal-Nicolle culture tubes prepared from rabbit's blood are inoculated with a few c.c. of blood from an arm vein, incubated at about 22 C., and the tubes examined daily up to twenty days for the flagellate stage of the organism. Bugs were readily fed on citrated blood through a membrane of rabbit's skin, and the parasite can survive at least twenty-nine days in the stomach of the bed-bug, where a hitherto undescribed stage of the parasite exists ; but they failed to transfer flagellates into a sterile nutrient fluid by the act of feeding through a rabbit-skin membrane. G. R. Ward[2] reports two cases of kala-azar in soldiers returned from Malta to England.

In last year's Medical Annual favourable results in the treatment of kala-azar by **Tartar Emetic** intravenously were reported by Cristina and Caronia in Sicily, and independently by Rogers in India. Further reports emphasize the importance of this advance. L. Rogers and N. H. Hume[3] record six consecutive cases in Europeans, with uniform and rapid improvement in all except one, who died of pulmonary and intestinal tuberculosis, although the kala-azar parasites had disappeared from his spleen. They use a 2 per cent solution, and beginning with 2 c.c. add 1 c.c. at each bi-weekly dose until a maximum of 10 c.c. is reached, and continue until the temperature has been normal for a long time, weight regained, the blood-count

become nearly normal, and the parasites have disappeared from the spleen blood, as shown by spleen puncture. They have also used inunctions of 5 per cent finely divided metallic antimony (or tartar emetic) in lanolin in the case of children, with promising results. They believe that in tartar emetic, and possibly other forms of antimony, a specific treatment for this terrible disease has at length been found.

U. N. Brahmachari[4,5] (*see also* p. 13) records the intravenous use of metallic antimony in kala-azar (as used by H. S. Ranken in human trypanosomiasis and yaws in 1913), and reports several cases in which patients remained free from fever for several weeks and improved in weight and in their blood-counts. In one patient who died of dysentery, antimony was found in the tissues post mortem. He also records a case of recovery after three intravenous injections of 40 c.c. **Formaldehyde** (40 per cent) in normal saline, and two in which Plimmer's salt (antimonyl sodium tartrate) appeared to do good. Galyl intravenously failed in four cases. He describes an apparatus for giving metallic antimony intravenously.

E. Muir[6] records further notes on the treatment of kala-azar with antimonium tartratum in Bengal. He has treated about one hundred cases in the last fifteen months. In most of them the parasite was found in the blood or in the spleen, and he records that all, except very advanced cases with œdema, dysentery, or cancrum oris, recovered, while some of the latter may do so. Using a 1 per cent solution, he begins with 3 c.c. and increases by 1 c.c. at each injection up to 10 c.c. if the reaction is not severe, giving the injections every other day, and continuing until the temperature has remained normal for a month, and then once a week for two months more. The drug may also be given by the mouth as 1-gr. doses with 3 gr. tannic acid and 4 gr. sod. bicarb. every morning and, if well borne, in the evening as well. During convalescence he sometimes gives metallic antimony intravenously.

L. Rogers[7] also records further cases of kala-azar in Europeans treated successfully with tartar emetic in a 2 per cent solution intravenously, in doses gradually increased from 4 to 10 c.c. Of 18 cases, 1 died of phthisis after recovery from kala-azar, 1 left hospital when only improved, and 1 was still in hospital much improved, while 2 more were greatly improved and likely to recover completely, and the remaining 13 were cured, some of them having remained in full work from six months to a year after leaving hospital. He regards the drug as an absolute specific for kala-azar.

Korkoris[8] records three cases of splenectomy in kala-azar, one of which recovered from the disease after it. [The spleen was removed in a case in Calcutta several years ago in what proved to be kala-azar. A well-marked temporary increase of the leucocytes followed, but the fever soon recurred, and the patient died of the disease a few months later.—L. R.]

References.—[1]*Ind. Jour. Med. Research*, 1916, vol. iii, No. 4698 ; [2]*Lancet*, 1916, ii, 16 ; [3]*Brit. Med. Jour.* 1916, Feb. ; [4]*Ind. Med. Gaz.* 1915, Dec., 455 ; [5]*Calcutta Med. Jour.* 1915, Dec., 287 ; [6]*Ind. Med. Gaz.* 1916, Oct., 36 ; [7]*Lancet*, 1916, ii, 782 ; [8]*Med. Rec.* 1915, Sept., 495.

LEPROSY. (*See also* X-RAY DIAGNOSIS.)

Sir Leonard Rogers, M.D., F.R.C.P.

Victor G. Heiser,[1] whose treatment of leprosy by intramuscular injections of **Chaulmoogra Oil** mixed with camphorated oil and resorcin was noted in last year's MEDICAL ANNUAL, contributes a further paper on the subject, with photographs of cases treated by his method showing great improvement, and concludes that although nothing like a specific for leprosy can be claimed for it, yet the oil gives more consistently favourable results than any other treatment, and he holds out hope of further improvement being brought about.

L. Rogers[2] reports that he has for some years given **Gynocardic Acid** by the mouth in leprosy, believing this substance to be the active principle of chaulmoogra oil, and has seen great improvement follow persistence with the treatment. He had previously tried unsuccessfully to obtain a soluble form of gynocardate for hypodermic injection, but after learning of Heiser's work he obtained a soluble gynocardate of soda and gave it hypodermically in from 2- to 4-gr. doses of a strength of 2 gr. in 1 c.c. of water. The injections cause some local pain and swelling, but more rapid improvement was obtained than by the oral use of the drug. In a second paper[3] he records details regarding the methods of separating gynocardates from chaulmoogra oil, and experiments showing that 2 and 3 per cent solutions can be given in large doses in animals intravenously with safety. Several weeks of experience of the intravenous use of the drug in doses from $\frac{1}{10}$ gr., increased by one-tenth at each injection up to $\frac{4}{5}$ gr., the injections being given twice a week, have convinced him that this method is superior to the subcutaneous one in being painless except for the prick of the needle, while in some cases reactions were obtained in the affected tissue, followed by more rapid improvement than previously seen, and so far without any bad effects except some fever. He mentions cases which have much benefited by the subcutaneous injections if persisted with for six months and over, but makes no claim to be able to cure the disease.

R. Hopkins[4] records fifteen years' experience of chaulmoogra oil and other treatment in 269 cases in the Lepers' Home of Louisiana. Improvement commonly occurs under the better hygienic conditions after admission. Occasional attacks of lepra fever may also bring about changes in the lesions. An attack of erysipelas may be followed by marked improvement. These favourable factors are overbalanced by the almost uniform tendency of leprosy to grow progressively worse. Chaulmoogra oil in doses gradually increased from 3 to 100 or more drops three times a day after meals has been given, with $\frac{1}{60}$ gr, doses of strychnine three times daily. Recently Dr. Mercado's emulsion of the chaulmoogra oil with camphorated oil and resorcin has been given intramuscularly. The chaulmoogra oil by the mouth often cannot be tolerated in sufficient doses; but in cases not too far advanced, a large percentage show improvement, while in 14 all the

lesions have disappeared as well as the bacilli, and they have been discharged cured, and 4 are apparently cured out of 82 incipient cases where the treatment has been continued for a long time. Of 88 advanced cases sufficiently treated to show results, 12 per cent are improved, in 5 per cent the disease is arrested, 9 left improved, 28 per cent show little change, 20 per cent are worse, and 23 per cent have died. A weak alkaline solution hypodermically was not well borne, but Mercado's emulsion in small doses is being used, and one tubercular case shows marked improvement with it. Dr. Vahram's emulsion for intravenous injection is also being tried ; though it has not been used long enough to justify conclusions, the results so far obtained are encouraging. (*See also* p. 14.)

A. Neve[5] records and illustrates a case of leprosy in which the diagnosis was made by means of *x* rays revealing the characteristic atrophy of the terminal phalanges of the toe. H. Morrow and A. W. Lee,[6] and also E. D. Chipman,[7] all of San Francisco, record their experience of the disease, the last named supporting Heiser's treatment. O. E. Denney[8] has extensively tried **Basic Fuchsin** of a strength of from 1–1000 to 1–500 aqueous solution in leprous ulcers with very favourable results, especially in early gangrenous cases.

References.—[1]*N.Y. Med. Jour.* 1916, i, 289 ; [2]*Lancet*, 1916, 288 ; [3]*Brit. Med. Jour.* 1916, ii, 550 ; [4]*N. Orleans Med. Jour.* 1916, Sept., 223 ; [5]*Ibid*, 1915, ii, 814 ; [6]*Jour. Amer. Med. Assoc.* 1915, ii, 931 ; [7]*Ibid*, 934 ; [8]*Philadel. Jour. Sci.* 1915, Nov., 357.

LEUKOPLAKIA.

J. S. Fraser, M.B., F.R.C.S.

Levy[1] states that the essentials leading to a practical understanding of leukoplakia are still unsettled. He records the following case : Male, age 70, was a non-smoker and denied syphilis. One brother had died of cancer of the stomach. Eight years before admission, patient first noticed pain in his mouth after the extraction of a tooth. This was followed by painful ulceration. Levy found plaques of irregular outline on the right cheek and on the gums of the lower jaw. Bacteriological examination was unsatisfactory, many kinds of organisms being found. Treatment was continued for two years but did no good, and the disease became more extensive. A general surgeon was consulted. The latter found an indurated mass involving the alveolar process at the angle of the right lower jaw. Microscopic examination confirmed the diagnosis of cancer. The right common carotid was ligatured and the right half of the inferior maxilla resected. The growth had extended into the muscles, which were removed, together with the parotid gland. On discharge, no areas of leukoplakia remained. The patient remained well for three years, but then noticed a return of white spots, and a papilloma was found inside the right angle of the mouth. The growth was removed, and on microscopic examination showed no signs of malignancy. One year later a tumour in the mouth was treated by fulguration, which did good but caused great pain. The patient declined further treatment.

Levy goes into the pathology of leukoplakia, and states that the condition is essentially a chronic inflammation of the mucous membrane, with infiltration, localized cellular hyperplasia, and keratinization of the epithelial layer. The following varieties have been described: (1) Idiopathic; (2) Syphilitic; (3) Arthritic; (4) Smokers' leukoplakia; (5) Glass-blowers'; (6) The variety due to wearing dental plates; (7) Mixed cases. Leukoplakia has been reported on the faucial pillars, tonsil, epiglottis, and arytenoids, in addition to the usual situations on the cheeks, gums, tongue, and palate. Barker has found it on the prepuce and anus, while Butlin has reported it on the vulva. Lecène has noted a case in the pelvis of the kidney. In some individuals the mucous membrane of the mouth is more susceptible to irritants than in others, but the two most important etiological factors are syphilis and tobacco. Landouzy states that the former is indispensable, while the latter is a valuable contributory agency. Joseph has never seen a case where the patient had not been a heavy smoker, and believes that the condition has nothing to do with syphilis, except in so far as the latter may be a predisposing cause in smokers. Guerini holds that when leukoplakia is due to syphilis it occurs on the tongue; when due to tobacco it appears on the lips or cheeks.

Barker divides the pathology into three stages: (1) Slight thickening of the epithelium; (2) Greater thickening, with a horny change in the cells and an exudation of leucocytes in the papillary layer; (3) Thick horny plaques, with atrophy of the papillæ. The place of the latter is taken by inflammatory exudate. Beffel considers leukoplakia a benign epithelial growth usually confined to the tissue external to the basement membrane. In advanced cases it penetrates this membrane and invades the connective tissue, thus becoming an epithelioma. Villanova speaks of two forms of degeneration: (1) Papillomatous (benign form); and (2) Epithelioma (malignant). Joseph states that the spectre of cancer stands in the background of every case of leukoplakia, though the malignant degeneration may take thirty years to develop. When involving the tongue, cancerous degeneration occurs more frequently, more constantly, and earlier than in leukoplakia elsewhere. Mantilla has collected 556 cases, of which 158 (31 per cent) developed epithelioma. Barker states that those who are predisposed to cancer by birth or surroundings offer a suitable soil for leukoplakia. The proliferation of the younger cells takes place under the horny layer, and, as they cannot be thrown off, they burrow under the papillary stratum to form a cancerous nodule. According to Leloir, epitheliomatous degeneration begins either at an ulcerated surface or, more commonly, at a fissure. With regard to the relationship between trauma and cancer, Levy states that no one has yet succeeded in producing cancer experimentally in animals by trauma, though none can deny the frequent occurrence of cancer in spots subject to long-continued irritation. With regard to the clinical manifestations indicating cancer, Marie holds that pain

radiating to the ears, enlargement of the submaxillary glands, and induration of the plaques are of great importance, while Barnard is of opinion that wart-formation, ulceration, fissuring, and nodule-formation are signs of malignant degeneration.

Treatment is unsatisfactory. Dittrich has obtained a cure with the actual **Cautery,** while others resort to **Excision.** Villanova uses the knife or **Radium.** Gaueher and Barber have reported two cures by **Mercurial** treatment. All are agreed on the importance of oral hygiene, the use of mouth-washes, and the removal of all sources of irritation. Levy himself recommends **High-frequency Currents.**

Reference.—[1]*Laryngoscope*, 1915, 539.

LEUCORRHŒA. *W. E. Fothergill, M.D.*

At last an authority has set forth in writing what practical gynæcologists have long been thinking. Chandler[1] points out the futility of the douche and the plug in the treatment of leucorrhœa. He has found a method of '**Dry Cleaning**' to have such good results that he strongly recommends it. With the patient in the dorsal position in a good light, the vaginal walls and cervix are exposed and wiped clean. Pure carbolic acid is applied to the lining of the cervical canal, but is not allowed to pass above the os internum. The vagina is then painted with a ½ per cent solution of iodine, and lightly packed with gauze. This treatment is repeated three or four times at intervals of forty-eight hours. Next, the vaginal walls are dusted with a powder composed of equal parts of boracic acid and stearate of zinc, and a gauze packing is inserted. This, also, is repeated three or four times at intervals of forty-eight hours.

If the iodine irritates the vaginal surface, the dusting powder is used instead of applying iodine twice running. In short, the dressings may be alternated. The patient is then told to report after her next menstrual period is over. One treatment generally cures, but if the discharge returns, a few further dressings may be required.

This method is said to work well in simple leucorrhœa, and also in infective cases of long standing. In acute gonorrhœa, Chandler puts the patient to bed, the vagina being lightly packed with gauze in which dry boracic powder has been incorporated. A urinary antiseptic is prescribed, the diet is made light, and copious fluid is swallowed. The gauze is changed each day until the acute stage is over. The iodine treatment is then carried out as above described.

Chandler is convinced that douches and moist tampons do not cure leucorrhœa. They irritate and eventually provoke the conditions they are intended to cure. [We agree with the writer. Certainly no woman will get rid of leucorrhœa so long as she is a slave to the douching habit. Dry-cleaning is certainly useful in infective conditions. But will it cure simple excess of the normal vaginal secretion?—W. E. F.]

Reference.—[1]*Ther. Gaz.* 1916, May, 341.

LUMBAGO. *Herbert French, M.D., F.R.C.P.*

Any rapid method of relieving or curing even the less severe cases of lumbago must be welcome. Haig[1] uses **Manipulative Treatment** as follows: (1) Deep thumbing of the lumbar muscles, in process of which a painful area is usually found either in the middle line or to one or other side. (2) Fixing the part of the vertebral column below this painful region by firm pressure of the thumb on each side of the spine. (3) Making the patient perform movements of flexion, acute dorsiflexion, lateral flexion, and rotation. The result is cure of the attack of lumbago, inasmuch as the patient is able to return to his work at once; and in no case has he had to repeat the process.

REFERENCE.—[1]*Brit. Med. Jour.* 1914, ii, 539.

LUNGS, TUBERCULOSIS OF. (*See* X-RAY DIAGNOSIS; X-RAY THERAPY.)

LYMPHADENOMA, (*See* HODGKIN'S DISEASE.)

MALARIA. *Sir Leonard Rogers, M.D., F.R.C.P.*

C. C. Bass and F. M. Johns[1] have published a description of their method of concentrating malarial parasites of the blood by centrifuging to allow of more accurate diagnosis for research purposes. It depends on the fact that red corpuscles containing the parasites are larger than normal ones, with the exception of those containing only small rings, so that on centrifuging at 2000 revolutions a minute for one minute for each centimetre of depth of the blood column, the leucocytes are found above the surface of the red corpuscles, and the malarial infected red corpuscles just beneath them on the top of the column of red cells in the first 0·1 cm. This layer is now taken up in a large pipette with an equal quantity of serum, and centrifuged again in a small test-tube of about 1·5 cm. diameter. With a large capillary tube, draw up not more than a 5 cm. column of the surface layer of red corpuscles and, after sealing the tube, centrifuge for the third time. The capillary tube is now cut off 0·1 to 0·2 cm. below the leucocyte layer, and a portion of the top layer of the red corpuscles taken up with a finer capillary tube and a blood-slide made and stained.

This method is said to produce a ten-fold greater number of parasites in a field than Ross's thick-film method, and a hundred-fold greater one than an ordinary thin-blood film, so that where a very scanty infection is present it will allow of the parasites being found much more readily than by any other method, except when only small ring forms are present. Crescents may be greatly concentrated by this plan, illustrations showing hundreds in a single field of the microscope being given in the paper.

E. R. Armstrong[2] records careful differential leucocyte counts in fevers, with special reference to the diagnostic value of large mononuclear leucocyte increase in malaria. He carefully distinguishes between large mononuclears and large lymphocytes, the essential characters of the former being that they must be at least as large as

the largest polynuclears, the nucleus must be less deeply stained than that of any other white cell except mast cells, and it must never be circular, and usually of a cherry-violet colour with Leishman's stain. He counted 400 leucocytes as a rule. He concluded that a large mononuclear count (excluding large lymphocytes) of 10 per cent was diagnostic of malaria, and that it persisted up to eight weeks after the cessation of the fever. He has also worked out his counts on the basis described by Rogers and adopted by Stott, that is, in which the large mononuclears and the large lymphocytes of at least the size of the average polynuclears are counted together as large mononuclears, but found his own plan of counting them separately gave more reliable results in detecting malaria. J. W. Scott Macfie[3] has made observations on the nuclear variations of neutrophile leucocytes in malaria after Arneth's method, and found a marked shift to the left of the Arneth count in malaria, both during the attack and for a considerable period afterwards, which was also the case in yellow fever.

W. V. King[4] has proved that *Anopheles punctipennis* is an efficient host of both benign tertian and malignant tertian malarial parasites, which hitherto has been disputed. S. R. Christophers and Khazan Chand[5] have found *A. culiciformis* (Cogill) breeding in tree holes in Southern India, and describe both the adult and larval forms in detail.

J. H. Dible[6] relates two cases of British soldiers, who had never been in the tropics, who contracted malaria in northern France after being bitten there by mosquitoes, which had possibly been infected by soldiers from India.

R. Lyons[7] describes three cases of malaria of various degrees in which treatment by mercuric chloride intravenously completely failed to destroy the parasites. N. Barlow[8] publishes a lengthy paper on the same method of treatment, the first part of which is a theoretical consideration of the possibility of ridding a population of malarial infection by destroying the parasites in their blood by the addition of some other drug to quinine treatment, and suggests that salvarsan and mercuric chloride are the most promising, but the former is too expensive. In the second part he records a large series of cases in which he attempted to obtain this result. He found that the mercury alone has a very limited effect in destroying the parasites, especially those in the spleen, but believes that it has a certain amount of destructive action on the gametes and produces a more rapid reduction in the size of the spleen. It cannot be relied on alone in malaria, but he hopes that, combined with quinine, it may cure cases more quickly, although he does not advise general practitioners to use it at present.

G. W. P. Dennys[9] advocates **Iron** and **Arsenic** in increasing doses as both a cure for, and a prophylactic against, malaria, especially in chronic cases which, in his experience, often resist even large and prolonged doses of quinine. Some years ago he carried out experiments in gaols to test the relative merits of daily 5-gr. doses of quinine as compared with arsenic and iron as a prophylactic and, although the

records are destroyed, the results went to show that 4 gr. of sulphate of iron with 4 min. of liquor arsenicalis twice daily after meals was very much more efficient than the 5 gr. of quinine daily. Since then he has used the same combination in the treatment of chronic malaria, the doses of arsenic being pushed up to the maximum that the patient can gradually be made to tolerate. At his suggestion Messrs. Burroughs and Wellcome make a tabloid consisting of—

℞ Ferri et Ammon. Cit. gr. iij Acid. Arsen. gr. $\frac{1}{60}$
Quin Sulph. gr. j

Beginning with one tabloid a day after food, they are gradually worked up to four if possible, and continued for two or three months.

For a discussion of the relative value of the **Cinchona Alkaloids** *see* p. 26.

REFERENCES.—[1]*Amer. Jour. Trop. Dis.* 1915. Nov., 298 : [2]*Ann. Trop. Med. and Par.* 1916. April, 85 : [3]*Ibid.* 1915, Dec., 435 : [4]*Ind. Jour. Med. Research*, 1916, April, 638 : [5]*Amer. Jour. Trop. Dis.* 1916. Feb., 426 : [6]*Lancet*, 1915, ii, 701 : [7]*Amer. Jour. Trop. Dis.* 1915. Oct., 243 : [8]*Ibid.* 1916. April and May, 545, 581 : [9]*Ind. Med. Gaz.* 1916, July, 242.

MALINGERING. *Deputy Surg.-Gen. A. Gascoigne Wildey, R.N.*

Under the abnormal conditions attending nations in arms, it is inevitable that the feigning of disease in order to avoid compulsory service should receive an impetus, and, as might be expected, new forms of ingenious malingering are encountered which, for a time, may prove highly successful in deceiving even the most careful of military surgeons. On the whole, cases of persistent and determined malingering are by no means common amongst the soldiers actively employed at the Front. Simulation of disease and exaggeration is more often found amongst newly-joined recruits and in nerve-racked convalescents. Excessive sympathy and over-attention from devoted amateur lady nurses tends to excite morbid sentimentality.

Blum and Dimier[1] draw attention to the danger of creating a notion of excessive gravity of an injury when, from want of proper skill, or through the inefficiency of apparatus, electrical treatment or special appliances fail to act beneficially. The over-long use of crutches and walking sticks, orthopædic appliances, etc., must be carefully avoided.

From time to time some novel method of simulating disease appears to gain a certain popularity. At present, on the Continent, the production of *jaundice* by the ingestion of picric acid attracts attention. Doses of 30 cgrms. twice a week are said to cause a true jaundice with bile pigments in the blood and urine. It can also produce a false form in which the bile pigments are absent but a special discoloration of the skin and mucous membranes is observed (Marchetti[2]). In the more acute cases there may be some enlargement of the liver and symptoms of gastro-enteritis. Convulsions and delirium have been noted in very severe cases. In the false form of jaundice the colour of the skin is orange-yellow with copper reflection. In true

jaundice the skin is yellow with greenish reflection. A chronic form is described (P. L. Marie[3]) in which the disease is kept up for months by taking small doses (0·25 grms.) at intervals of ten to fifteen days. In these chronic cases the general health may not be impaired. Their extreme persistency may be sufficient to excite suspicion.

The urine in cases of picric-acid jaundice is at first characterized by a more or less deep-red colour with red or reddish-yellow froth. Later it gradually becomes successively red and yellowish-red, and continues, although gradually fading for many days after the ingestion of the acid (Marchetti). The urine is stated to keep for a very long time without putrefaction. With acids the red colour turns yellow. In neutral or alkaline urine the picramic derivatives disappear more or less rapidly; therefore only recent urine should be used for testing. For picric acid products the following test is made use of by Marchetti: The urine is strongly acidulated with sulphuric acid; as a result it loses its abnormal colour. A delicate test for traces of picric acid and for picramic products is supplied by de Methouard. To 2 c.c. of suspected urine in a test-tube add 1·3 c.c. of ammonia. Shake, and with a drawn pipette introduce 1 c.c. of the following solution: free ferrous sulphate 2 grms., tartaric acid 10 grms., water 100 c.c.; conveying the solution to the bottom of the test-tube. The appearance of a ring of deep cherry-red indicates the presence of picramic acid. A blue ring below the red indicates further advanced reduction products. The property of picramic acid to dye wool with a fast stain is also used in testing urine. The picramic acid is extracted from the urine by acetic ether, and the wool dyed by immersion in a watery solution of the dried extract. Only the positive evidence of picric acid or its derivatives in the urine can justify a diagnosis of picric-acid jaundice.

Artificial abscesses have been produced by subcutaneous injection of turpentine and of paraffin (Hollande).[4] Under the microscope, oil globules of turpentine or paraffin are found which reduce osmic acid in the presence of Nile blue; turpentine giving a brownish-yellow colour and paraffin a golden-yellow. The globules of turpentine dry when exposed to the air. Pus from these artificial abscesses treated with warm alcohol dissolves out any turpentine or paraffin. Paraffin in alcohol gives a deep-brown tint with commercial formol. Turpentine is detected by the odour of the pus and of the urine, and by Dibau's test.

Forgues[5] gives examples of other more or less novel forms of malingering. *Phagedænic sores and inflamed glands of the groin* are produced by scratching the foot with a needle steeped in fæcal matter. *Mucous patches* are imitated by cauterization with a lighted cigarette. A highly concentrated decoction of carrots gives to the urine the appearance of *hæmaturia*. *Malaria* is simulated by means of aloes applied by punctures on the flanks, or by an infusion of laurel-water. *Dysentery* is caused by enemata of a saturated solution of alum.

followed by the introduction within the anus of pledgets of cotton-wool steeped in the same solution. *Fainting fits* are produced by rectal injections of tobacco-water.

Clever malingerers are stated to simulate *albuminuria*[6] by injecting the urethra and even the bladder with a weak mixture of white-of-egg and water. This can be detected by carefully adding Maurel's test solution (solution of caustic soda 33 per cent, 25 c.c.: solution of sulphate of copper 3 per cent, 5 c.c.; glacial acetic acid, 70 c.c., which forms a precipitate at the line of junction of the urine with the solution. The test gives no precipitate with serum-albumin.

References.—[1]*Brit. Med. Jour.* 1916, June, 25 (epit.); [2]*Ibid.* Oct. 13 (epit.); [3]*Ibid.*; [4]*Lancet*, 1916, ii, 80; [5]*Brit. Med. Jour.* 1916, June 25 (epit.); [6]*Lancet*, 1916, ii, 80.

MARCHING, FATIGUE FROM.

Deputy Surg.-Gen. A. Gascoigne Wildey, R.N.

Bramwell[1] deals with this subject in an interesting manner. It is noted that in consequence of the necessity of restricting the length of stride to that of the average man, the tall and the short men, working at a disadvantage, are most liable to fatigue. Proper training in control of the balancing mechanism of the body, to overcome the natural tendency to sway when carrying a load, a tendency that must be checked when marching in close formation, vastly increases the staying power, the fatigue of the untrained being largely due to the unusual strain on the balancing muscles. It is highly necessary to avoid changes in the length of step by those in front of a column on the march, since the slightest shortening is felt to an exaggerated degree at the rear end, upsetting the swing of the march and adding thereby to fatigue. The importance of a regular rhythm is insisted upon. When no band of music is available, it is found that the rhythm can be maintained most satisfactorily by a front section of four guides representing the various heights of the men and marching some distance in front of the rest. These guides set an average pace, and are found to give a more satisfactory rhythm than a single guide marching on the left as is the usual custom.

Until the maximum temperature of the body under stress of active muscular work is reached—a temperature which, according to Melville, exceeds the normal 'rest' temperature by about 2°F.—heat formation is in excess of heat loss. There is excessive expenditure of energy if the men cannot march at their normal pace. To avoid this initial waste of energy, the stride is shortened for the first half mile and then gradually increased until the normal is reached. This is found to be better than decreasing the rate of step.

It is emphasized that no halt for less than half an hour affords any real rest. If a pause is necessary, as is usually the case early in the march to adjust accoutrements, etc., it should not exceed five minutes. A pause of ten to fifteen minutes is condemned because it allows the muscles to stiffen and is not long enough to afford any

real rest. Under the favourable conditions of climate in Egypt, Bramwell found that his light-marching field-ambulance corps preferred to march for three hours without a rest and with only one pause. When 'resting,' the rest should be complete. Equipment should be removed, all muscles relaxed by lying on the back. The spot selected for the halt should be airy. To avoid chill, open tunics and shirts should be buttoned.

Attention has been drawn to the fact that the humidity of the atmosphere is greater, and the air more charged with dust, at the rear of a long column on the march, so that the men in the rear may be expected to be the first to show signs of fatigue. The results of experimental marches seem to show that while on the march, smoking should be limited to pipe-smoking after meals, and that cigarettes should be forbidden.

Reference.—[1]*Med. Chron.* 1915, Oct. 1.

MASTOID. (*See* Ear, Diseases of.)

MENINGITIS. *J. Ramsay Hunt, M.D.*

Chiray[1] discusses *pyocephalus* as a cause of failure in the serum treatment of epidemic cerebrospinal meningitis. During a small epidemic of this affection (forty cases), this complication was observed in three. Post-mortem examination showed the ventricular system distended with seropurulent fluid, the cortical meninges presenting only a few plaques and scars, especially over the base of the brain. There was a striking contrast between the healed cortical lesions and the ventricular process, which was still active and contained meningococci.

Clinically, pyocephalus is characterized by persistence of rigidity, Kernig's sign, progressive emaciation, and cerebral symptoms. There is usually choked disc. The temperature in chronic cases may be normal, but it is usually intermittent. Lumbar puncture reveals a gradual diminution of leucocytosis and meningococci, and eventually the spinal fluid becomes normal. The presence of normal cerebrospinal fluid and the persistence of clinical symptoms is especially characteristic. Chiray describes a transitory exacerbation of symptoms after intravenous injections of automeningitic serum. This he regards as a special *reflex sign* of pyocephalus, and not as a result of anaphylactic shock. Pyocephalus is especially frequent in infants on account of anatomical peculiarities in the foramina of communication with the pericerebral space. As the bones of the skull have not united at this early age, the head swells and the clinical appearance of hydrocephalus results.

Treatment.—This consists of **Puncture** of the lateral ventricle and the introduction of **Therapeutic Serum** directly into the ventricular cavity. This procedure may be repeated at intervals, and has been the means of saving even desperate cases.

Reference.—[1]*Presse Méd.* 1915, Dec., 481.

MENTAL DEFICIENCY, HIGH-GRADE. (*See also* FEEBLE-MINDED, CARE AND TRAINING OF.) *Bedford Pierce, M.D., F.R.C.P.*

Jane Robertson[1] points out a class of high-grade mental defectives which require special description. An interesting case is quoted showing the great difficulty in dealing with this disorder, and the trouble and anxiety caused to relatives through the failure to recognize the morbid nature of the symptoms sufficiently early. These cases present six characteristic features: precocity in intellectual development; extreme voracity in reading, an unusual flow of language, but without much originality; a quick, alert manner, unaccompanied by average output of work; marked emotional indifference, especially to claims of parents or society; and lastly, a characteristic tendency to romance which becomes a permanent habit of lying in a plausible, unblushing manner that is clearly pathological.

These patients are therefore far from stupid, are not in the least backward; they may pass through school life without recognition, but when confronted with the responsibilities of life they are wholly untrustworthy and incapable of sustained effort. They appear so intelligent and bright that the question of mental deficiency does not arise until some overt act brings them to the police court, or in some other way they are disgraced.

Jane Robertson suggests that school authorities should closely watch precocious and odd children, so that, if possible, defectives of this type should be taken care of before they enter upon ordinary life, and be promptly segregated and taken care of permanently; otherwise they cause endless trouble and expense both to relatives and to the community.

The same point of view is taken by William Healy and Mary T. Healy,[2] who define pathological lying as "falsification entirely disproportionate to the end in view, engaged in by a person who, at the time of observation, cannot be definitely declared insane, feeble-minded, or epileptic." The pathological liar is therefore a species by himself. The lying rarely concerns a single event, but is the symptom of a habit of mind. Histories of twelve patients are recorded, only one of whom was a man.

REFERENCES.—[1]*Jour. Ment. Sci.* 1916, July, 485; [2]*Pathological Lying, Accusation, and Swindling* (Heinemann) (*Rev. of Neurol. and Psych.* 1916, April, 189).

MENTAL DISEASE, GENERAL. (*See also special articles.*) *Bedford Pierce, M.D., F.R.C.P.*

Epifanio[1] has attempted to promote recovery in mental disease by inducing pharmacological hypnosis. He noted in the psychoses due to infection that a profound sleep marked the end of the malady. He administered a hypnotic in doses that would dull sensibility and produce a prolonged sleep, but which would not result in extreme narcosis. **Luminal Sodium** was administered subcutaneously in ten cases in doses of 20 to 80 grms. for five to twelve days in succession.

An increase in body weight was observed, and there were no bad symptoms. Recovery occurred in four cases, and had continued for two years; two of them belonged o the manic-depressive group, one was early dementia præcox, and one was of an indeterminate nature. In the others, no improvement was noted. He reports, however, upon the disappearance of hallucinations. [The dose of luminal sodium is a good deal larger than the writer would care to administer to begin with.—B. P.]

William White[2] advocates the employment of the **Continuous Bath,** but lays stress on the importance of having someone constantly in attendance, and that no mechanical means must be used to keep the patient in the bath. He points out that the heat-regulating mechanism may break down, when there is grave danger of scalding the patient.

Diet and Mental Disease.—Mercier[3] reports thirty-five cases of mental disorder which had come under his notice within three years, in which he ascertained that the accustomed diet contained an excess of fats or of starches and sugars, and a deficiency of nitrogenous foodstuffs. He concludes that in a certain small proportion of cases the disease is due to errors in diet, and can be cured by rectifying the error. However this may be, it is well that attention has been drawn to this subject, for it is clearly necessary to investigate every possible source of mal-nutrition, and among these, errors of diet must always be important.

Melancholia Associated with Low Blood-pressure.—Donald Fraser[4] describes the case of a widow who for two years suffered from repeated paroxysmal attacks of depression lasting from one to three days. The patient recovered slowly after many relapses. The blood-pressure taken by the Riva-Rocci sphygmomanometer was found to be low when she was depressed, viz. 100 to 110 mm. Hg, whereas during the intervals of the depression it rose to 120 to 130 mm. It was noted that an increase in the blood-pressure produced by pressure of a sand-bag on the abdomen, or by the administration of adrenalin, pituitrin, or digitalis, had no effect upon the mental symptoms.

References.—[1]*Riv. di Patol. Nerve e Ment.* (quoted in *Rev. Neurol. and Psych.* 1916, Feb., 95); [2]*Amer. Jour. Insan.* 1916, Jan., 481; [3]*Jour. Ment. Science*, 1916, July, 510; [4]*Jour. Abnorm. Psych.* 1916, 400.

METEORISM. (*See* Flatulence.)

MONILITHRIX. *E. Graham Little, M.D., F.R.C.P.*

McKee and Rosen[1] contribute six new cases of this rare disease, and summarize the previously recorded cases, some 113. The characteristic feature is the presence of beaded hairs, offering a certain resemblance to a necklace (Latin, *monile*), the beading being occasioned by regularly occurring constrictions of the shaft of the hair, which cause a nodose appearance: but it should be noted that the nodal

part is of the normal thickness of the hair. The disease is usually noticed either at birth or soon after, exceptionally at adult ages; it is often familial, may affect the whole scalp and other hairy parts, and is evidenced by the breaking off of the hair at a distance of about a quarter of an inch from the follicle; or the affected surface may be quite bald. When the affection occurs in patches on the scalp, the favourite sites are the frontal and temporal regions, the vertex, and nape of the neck. There is usually pityriasis of the scalp and keratosis pilaris.

The pathology is unknown, the arrest of development being ascribed to a trophoneurosis. It is noteworthy that the medulla is absent at the internodes, and is sometimes entirely absent throughout the hair, and often, if present, is irregularly distributed. Fractures take place at the internodal constrictions, thus offering a sharp distinction from trichorrhexis nodosa, in which fracture takes place at the node.

No treatment is of the smallest utility.

REFERENCE.—[1]*Jour. Cutan. Dis.* 1916, 444 and 506.

MUSCLES, ADHESIONS OF. (*See* TENDONS AND MUSCLES.)

MUSCLES, INJURIES TO. *W. I. de C. Wheeler, F.R.C.S.I.*

Alexander[1] describes eight cases of rupture of the biceps muscle in the arm. In 64 cases reported, 16 occurred in the tendon, 44 at the belly of the muscle, and 6 at the junction of the tendon and muscle. The causes may be either muscular contraction, or possibly an indirect force, such as a fall on the shoulder. Probably muscular contraction is the most potent etiological factor. If the rupture is through the belly of the muscle, a furrow can be felt between the two ends; this can be widened by extending the forearm. In rupture of the tendon of insertion, the belly of the muscle is drawn up nearer the shoulder: flexion and supination of the forearm may be interfered with. In rupture of the long head, the biceps bulges at a point nearer the elbow than normal, and there is an inability to feel the tendon above that point. The treatment in the great majority of cases has been either none at all, or simply a bandage and sling. Alexander states, however, that the conservative treatment has given satisfactory results in only a few isolated cases; operative treatment is therefore to be recommended. Hüter's sign, viz., that flexion of the forearm in pronation, when the biceps is tense, is more forcible than when the forearm is supinated and the biceps is relaxed, was present in only one case of this series.

Boehme[2] describes injuries of the muscles of the abdominal wall caused by the sudden rotation of the body or the sudden extension of the abdominal muscles, and records four cases brought about by the sudden throwing of a weight, with the twisting of the body laterally. In all instances the traumatism was occasioned by the sudden contraction of the muscles of the abdominal wall against a resistance. There was a sense of something giving way, with a sharp pain. In

some instances breathing, where of the abdominal type, was painful and markedly limited. On examination, a point of tenderness was made out, either in the rectus injured or in the oblique muscles (three cases). Sometimes a slight separation, as evidenced by a dimple-like depression on attempting to use the muscle, could be made out. Movements using these muscles were very much limited by pain at the site of the injury. The pathology of the process is simple. Apparently, with the intense muscular strain, certain fibres in the recti or oblique muscles are ruptured, and the tear creates a painful area within the muscle bodies.

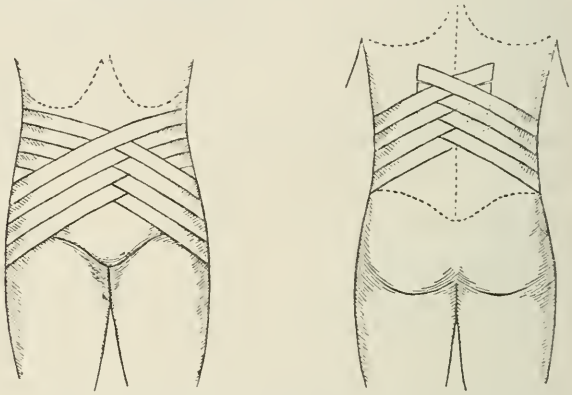

Fig. 92.—Adhesive plaster dressing for injuries of muscles of the abdominal wall.

Treatment.—This at first was something of a bugbear. Tight bandages were employed. but gave only transitory relief, as did abdominal belts. Local applications in the form of counter-irritants or lotions gave little or no relief. Finally an **Adhesive Plaster Dressing** was employed, which has proved eminently satisfactory. An adhesive band, 2 inches in width, was started just external to the anterior superior spine of the uninvolved side, and carried in the general line of the external oblique on the involved side, around the body to the opposite side of the vertebral column. This was applied during complete expiration. From the opposite anterior superior spine a similar band was carried in the direction of the uninvolved external oblique, crossing the first band at the median line and ending on the opposite in the back. As many bands were carried up the body as were necessary to immobilize the abdominal wall and to relieve the pain. The relief was instantaneous: the patient was able to resume work of a general variety, although torsion movements were interdicted. As a rule, recovery ensued in about two weeks. (*See Fig.* 92.)

These torsion injuries occur more frequently than is generally supposed, and their treatment, as outlined above, will be found materially simplified.

References.—[1]*Ann. Surg.* 1915, i, 608; [2]*Med. Rec.* 1915, ii, 1092.

MUSCULAR DYSTROPHY, TRAUMATIC. *J. Ramsay Hunt, M.D.*

The concentration of a highly specialized neurological technique on the injuries of modern warfare has resulted in the discovery of many curious clinical types. One of these is a form of muscular dystrophy described by Claude, Vigouroux, and Lhermitte[1] consecutive to the traumatism of war. Usually, the injury is a bullet or shell wound, the track of which bears no direct relation to the distribution of the atrophy. This is confined to the muscles of the shoulder girdle, particularly the trapezius and serratus magnus. There is deformity of the scapula, with weakness and atrophy of the affected muscles and diminished electrical responses. There are no reactions of degeneration, and the electrical changes are purely quantitative in character, as in the primary myopathies. There are no sensory disturbances, and nothing in the distribution or character of the atrophy, to suggest a lesion of the central or peripheral nervous system. Nor is there any injury to the bone or articulation which might give rise to a reflex or articular atrophy. It is essentially a non-progressive, localized, muscular dystrophy of traumatic origin, probably induced by a nutritive disturbance of muscle tissue, the result of injury. Four cases very similar in type and distribution are recorded. The authors emphasize the occasional occurrence of trauma as an etiological factor in the primary myopathies.

Reference.—[1]*Presse Méd.* 1915, Oct., 393.

MYASTHENIA GRAVIS. *J. Ramsay Hunt, M.D.*

One of the interesting neurological problems of the day is the etiology and pathology of myasthenia gravis. The symptomatology of this affection is well known, so that diagnosis is comparatively easy, while the underlying pathological factors are as obscure as ever, and the treatment is limited to general and symptomatic measures. As in many other obscure affections, disturbances of the ductless glands have been thought to play a rôle, and various members of this glandular series have been under suspicion. Oppenheim some years ago called attention to lesions of the thymus gland in this disease. Later, Neigert reported a lymphosarcoma of the thymus gland with cellular infiltration of the muscles, and many autopsies have been recorded in which there has been some abnormality of the thymus. In this respect the association of myasthenic symptoms in Basedow's disease is interesting, for enlargements of the thymus are very common in this disease. Chvostek formerly ascribed an importance to the parathyroids, regarding myasthenia as the result of hyperfunction or dysfunction, and tetany as a hypofunctional disturbance of these glands. The evidence on which this theory was based is, however, very slight. The adrenals have also been supposed by some investigators to be at fault, and pigmentation of the skin and alterations of blood-pressure are of not infrequent occurrence.

Bookman and Epstein[1] have recently investigated the metabolism of myasthenia gravis, and the effects of the administration of **Calcium**

and various **Glandular Preparations**. The metabolism of nitrogen, phosphorus, sulphur, calcium, and magnesium, and the ammonia and creatinin excretion, were studied during rest, after exercise to the point of exhaustion, during the administration of epinephrin and of thymus gland, and also after the prolonged administration of calcium. A study of the tables shows that, except for the creatinin, there was no striking variation from the normal in any of the constituents studied during any of the experiments. There was throughout a retention of calcium, of magnesium, and of sulphur, and except for a very slight loss in the last period, a substantial retention of nitrogen and phosphorus. There was no disturbance of the ammonia excretion, even during the exercise period, although at this time there was less retention of nitrogen. There is, therefore, contrary to the opinion held by some, no evidence of an acidosis in their case. In common with previous observers, they found a low creatinin excretion. This shows best in the creatinin coefficient, which averages 4·8 mgrms. creatinin-nitrogen per kilo (normal 7 to 11 mgrms.), while the ratio excreted to the total nitrogen averages 3·6 per cent (normal 3·9 per cent).

A prolonged administration of calcium, of ovarian substance, of testicular substance, and of thymus had no apparent effect on the clinical course, while the administration of epinephrin produced cardiac palpitation and tachycardia after each administration, together with flushes and a feeling of weakness. Their work offers no support for the administration of calcium, thymus gland, ovarian, or testicular substance in this disease, while the use of epinephrin was clearly harmful.

REFERENCE.—[1]*Amer. Jour. Med. Sci.* 1916, i, 267.

MYCOSIS FUNGOIDES. *E. Graham Little, M.D., F.R.C.P.*

Wise and Rosen[1] give a careful clinical and histological description of a case of this disease, and also of one of parapsoriasis, to distinguish which is of importance, as the prognosis and treatment are totally different. In both the early stage of mycosis fungoides and in parapsoriasis, chronic slightly infiltrated patches of scaly dermatitis occur, and the most important clinical distinction lies in the presence of intense pruritus in mycosis fungoides as a rule, and its absence in parapsoriasis. The patches in mycosis fungoides are usually more infiltrated, with more salient contour, sharper demarcation, and with a tendency to involute in the centre, with the formation of more or less ringed lesions. Sooner or later, urticarial, lichenoid, and psoriasiform changes occur, with weeping and crust-formation. With the advent of tumour formation, of course, all doubts are resolved. Histologically, in mycosis fungoides, mitosing cells are much more frequent, the œdema of the papillary layer is more pronounced, the lymph spaces are greatly dilated, and there is much proliferation of the rete. These appearances are lacking in parapsoriasis.

The effect of **X Rays** affords a means of distinction of some importance, mycosis fungoides in the early stage reacting well with radiation

on the whole, which fails to produce the least alteration in parapsoriasis. The latter is one of the most intractable of skin diseases, but fortunately gives rise to few unpleasant symptoms beyond disfigurement. Mycosis fungoides, on the other hand, seems to improve in many cases remarkably with *x*-ray treatment, but usually relapses. The tumour stage is seldom kept at bay for long, and, when it has set in, usually marks the end, for it is an almost uniformly fatal disease.

REFERENCE.—[1]*Jour. Cutan. Dis.* 1916, 95.

NASAL ACCESSORY SINUSES. *J. S. Fraser, M.B., F.R.C.S.*

Sullivan[1] recommends: (1) That in every case of sinusitis the nose should be examined before and after the application of cocaine and adrenalin. (2) It should be syringed with normal salt solution and the reappearance of pus looked for. (3) Transillumination. (4) X-ray examination and comparison of the radiogram with transillumination. Sullivan finds that a radiogram is not an infallible means of diagnosis. A plate may apparently show trouble in the frontal sinus, whereas at operation there is little or no disease. (5) Posture test for antrum and frontal, sphenoids and ethmoids. (6) Proof puncture of antrum. (7) Probing and irrigation of frontal. (8) Similar investigation of sphenoid and ethmoid. He admits that it is impossible at times to differentiate between disease of the posterior ethmoidal cells and disease of the sphenoidal sinus. He finds the long Killian speculum a help in the examination of this region. Sullivan has found the Ballenger operation for exenteration of the ethmoid very satisfactory. In twenty cases he has had no complication.

Coffin[2] states that he has ceased to think of the cure of disease of the accessory cavities, whether operation is performed or not. He is satisfied if he can arrest the trouble. He finds that most radical operations have been followed by recurrence, while a sinus once diseased seems more liable to reinfection. Coffin advocates the employment of **Negative Pressure** in conjunction with autogenous **Vaccines.** After the vacuum has been produced, he forces medicated air into the nose and accessory sinuses by means of a special apparatus attached to the vacuum instrument. The apparatus consists of a connecting tube ending in an olivary nozzle. To this two bottles are attached—the vacuum bottle and the medicating bottle. The physician can either apply suction by means of a vacuum pump and bottle, or he can shut off the vacuum and force in medicated air through the medicating bottle by using a force-pump.

REFERENCES.—[1]*Laryngoscope*, 1915, Sept.; [2]*Ibid.* Dec.

NEPHRITIS, AND RENAL FUNCTION. *F. D. Boyd, M.D.*
John D. Comrie, M.D.

Nephritis amongst British Troops.—A number of articles have appeared on the epidemic form of nephritis as seen amongst the British troops in Flanders. Langdon Brown[1] points out that while typhoid and dysentery have in the past dogged most campaigns,

acute nephritis as a rule has not. It does not seem to have been prevalent in the Franco-Prussian, the Chino-Japanese, the Soudan, the Hispano-American, or the Russo-Japanese Wars. On the other hand, there was a considerable outbreak of the disease in the American Civil War during the prolonged period of trench warfare. Cold and exposure are generally blamed as etiological factors in nephritis; but troops in other campaigns have been exposed to cold, exposure, or violent changes of temperature, without resulting nephritis. It seems doubtful if exposure can ever damage healthy kidneys. Contaminated water has been suggested as a cause, but there seems no evidence to support such a hypothesis. Various other causal factors have been mentioned as possible, but the most plausible seems to be a suppressed form of scarlet fever. Sore throat is undoubtedly not uncommon at the commencement of the disease, and otitis media may occur. No doubt there is a similarity between trench nephritis and scarlatinal nephritis, but the two do not seem to be identical, and desquamation does not occur in trench nephritis, as would have been expected if suppressed scarlet fever had been the cause. The type of nephritis is anatomically a subacute diffused nephritis, and clinical tests show damage to both glomeruli and tubules.

Rose Bradford[2] contributes a study of 1455 cases of nephritis which were treated in the base hospitals of the British Expeditionary Force in France. In these, tube-casts were found in the urine in 794 cases, absent in 507, and were not looked for in 154. Casts were often abundant, especially granular and hyaline. Blood-corpuscles also were frequently found, but definite blood-casts not often. The urine was usually small in amount—sometimes completely suppressed for periods of from twelve to twenty-four hours. In only three cases was a fatal issue observed by the author, and in all three the malady was not a simple acute nephritis. In all the other cases where suppression developed, the patient recovered from the uræmic phenomena and was able to be evacuated to England. Dropsy occurred in the majority of the cases, but was usually of transitory duration, generally persisting only for a week or ten days. It was remarkable how exceptional was the well-known facies of acute nephritis. In the early stages of the disease, albumin was present in the urine in very large amounts, and albuminuria was more persistent than dropsy. Of the uræmic phenomena, apathy, drowsiness, and a subnormal temperature were the most common. Vomiting was not usually severe. Epileptiform convulsions were by no means uncommon, and it was remarkable how the convulsions recurred when the patient showed no very marked symptoms of uræmia. Uncomplicated cases usually recovered from these convulsions.

When the forms of acute or chronic nephritis as seen in civil life are eliminated, there remain the bulk of the cases which conform to one type—not common in civil life. The two outstanding features are the rapid subsidence of the dropsy, and the remarkably low

mortality when the severity of some of the uræmic attacks is taken into consideration. One of the remarkable features of the outbreak of nephritis was that it was confined to the British troops, and did not occur amongst the Indians.

Various theories have been advanced as to the cause of trench nephritis. Dun[3] concludes that it is the result of embolisms blocking the glomerular vessels, and suggests the source of the embolisms may be found in lung lesions due to an inhaled irritant, as chlorine or shell gas. White[4] ascribes the malady to lead ingested during the consumption of tinned food. He examined the urine of five patients, and found lead present in all of them. Gabbi[5] describes the conditions as found in the Italian troops, whose symptoms are very similar to those described by British observers. He excludes cold as a causal factor, as most of the cases occurred in June. He also excludes alcoholism, rheumatism, typhoid, etc. Thornley[6] reports on the presence of an organism in the blood in patients suffering from the disease, which organism takes the form of a minute diplococcus.

Metabolism in Nephritis.—Foster and Davis,[7] in studying the metabolism of nephritis patients, paid special attention to the effect of water intake on nitrogen retention. They found that the nitrogen excretion seemed to bear some relation to the volume of urine. Careful observations were then carried out on a number of patients. When a patient was placed on a fixed diet and the amount of nitrogen of the food and urine estimated, nitrogenous retention took place when the fluid intake was restricted. When the fluid intake was pushed and the amount of urine increased, nitrogen excretion increased above the amount ingested; there was, in fact, a washing of nitrogen from the body. The cases are illustrations of a more or less successful application of a principle to attain a definite result—the prevention of nitrogen retention and the washing out of nitrogen retained during some previous period. As a method in practice we must make every reservation as to its efficiency. The cases observed were in hospital, representative of advanced stages of the disease where at best but little benefit could be expected. We do not at present know whether periods of nitrogen retention accompany the earlier and often transient manifestation of renal disease. It is self-evident that large amounts of fluid cannot be taken by every nephritic without danger. Each litre of water ingested represents an appreciable extra burden thrown upon the heart muscle, and with nephritics of all types we find this muscle abnormal, and especially so when there is nitrogen retention. Hence, with every case, caution is necessary, and with some, the excess of fluid might be hazardous. In cases where the renal damage is so extensive that there is no margin of accommodation, or where water elimination is impaired, no benefit is secured by the forcing of fluids. The authors point out that in nephritis there is often a retention of amounts of nitrogen in excess of what can be explained by increases of the non-protein nitrogen of the blood. A retention of a gramme a day is common, two or three

grammes a day for a couple of weeks not rare. What becomes of the fifteen or twenty grammes so retained by a patient whose condition excludes the idea of cellular growth? Not half the amount of nitrogen can be accounted for in the blood. It is evident that the surplus must be in the tissues, either free or combined.

Test Renal Meals.—Christian Frothingham O'Hare and Woods[8] discuss test renal meals in relation to renal function. The excretion of water, sodium chloride, and nitrogen has been tested by most observers. One method is to place the patient upon some form of diet which contains approximately the same amount of nitrogen, sodium chloride, and water daily, with a caloric value varying but little from day to day. The excretion of urine, sodium chloride, and nitrogen on this diet is estimated. Then on different days the patients receive, in addition to the diet, 20 grms. of urea and 10 grms. of sodium chloride, and the ability of the kidney to exerete these added amounts of nitrogen and sodium chloride is determined. Hedinger and Schlager studied the question by submitting the patient for one day to a diet in which different meals contained varying amounts of water, sodium chloride, and nitrogen. The urine was collected in two-hour periods during the day, and estimation made on each two-hour amount. The test-meal day was preceded by two days on which the patient was on a light mixed diet containing 8 to 12 grms. NaCl, and with a fixed quantity of fluid, and on these days merely the excretion of water in relation to fluid intake was measured. The authors find that the two forms of testing renal function in relation to test diets agree quite well in their results. That the results agree very closely in any quantitative sense is, of course, not to be expected. They found that if added salt or added urea were given on several occasions, the results were rarely quantitatively identical, but there is generally a striking similarity in the results from period to period. The study of salt and nitrogen excretion by means of test diets is found relatively of less use in determining the prognosis than are some of the other functional tests, such as phthalein excretion and the amount of blood nitrogen, which are less costly in labour and time.

Discussing *the use of diuretic substances in chronic nephritis*, the authors find that in a hundred cases of chronic nephritis these substances failed very generally to produce diuresis when used alone. Occasionally, when used in conjunction with digitalis, there was a diuresis, and here the digitalis alone may have been the cause of the diuresis. Diuretic substances would seem to have little value as eliminants of toxic substances in chronic nephritis without œdema. Further evidence is certainly needed to justify the use of diuretics in uræmic conditions without œdema, in view of the evidence which has accumulated that the diseased kidney is abnormally sensitive to fatigue, and that diuretics may cause fatigue and consequent decrease in renal function, while in animals with acute lesions they are often demonstrably harmful.

Christian,[9] of Boston, in a study of the action of diuretics in

chronic nephritis, points out that it was known from former studies that certain diuretic substances shortened the lives of animals with acute experimental nephritis: also that in the same disease diuretics decreased renal function. Similar observations were made in acute nephritis complicating 'grippe' in man. The effects of theocin (as representing diuretics) were varying; there might be an increase or decrease of diuresis, of salt, or of nitrogen, but NaCl was more often increased than nitrogen, and tended to parallel water excretion. The conclusion drawn from charts of cases seemed justifiable that theocin caused an inconstant and not marked effect in acute nephritis. In chronic nephritis in man, and in chronic cardiorenal disease, theocin produced diuresis in inverse ratio to renal function. When diuresis was produced, it was followed by reduced renal function, suggesting the advisability of an intermittent use of diuretics. There might be diuresis without increase of nitrogen output, and this made questionable the use of diuretics for detoxicating purposes. In many cases with severe nephritis, diuretics are probably harmful, being followed by no diuresis, no increase in urinary ingredients, and by diminution in renal function.

Discussing the *non-protein nitrogen of the blood, especially in its relation to nephritis and renal function*, Boyd[10] points out that much credit is due to the French school, and especially Widal and his collaborators, who have strongly insisted on the importance of an estimation of the non-protein nitrogen of the blood as a factor in the prognosis in nephritis. It is only recently that accurate clinical methods have been introduced, and observations in clinical work become possible. The non-coagulable nitrogen of the blood in health, according to Folin and Dennis, stands at 22 to 26 mgrms. per cent. and can be influenced by diet; but the writer found that in the average hospital patient the figures stood higher. Thus, a case of cardiac disease, where compensation was fairly established, gave a figure of 46 mgrms. per cent on ordinary diet, which was reduced to 29 per cent on a protein-free diet. All cases of nephritis do not show nitrogen retention. Seven cases are given where the blood nitrogen showed no marked increase above that of the ordinary hospital patient, though the phthalein test showed considerable interference with renal function. The second class of nephritics—those who show a figure for blood nitrogen of from 50 to 100 mgrms. per cent—are suffering from definite and serious nitrogen retention. In most the prognosis seemed bad, and this was justified by the outcome. In one case there was a definite history of syphilis and a positive Wassermann reaction, and improvement took place under mercury and iodide, though the blood nitrogen stood at 98 mgrms. per cent. The conclusion is drawn that when the blood nitrogen rises to between 50 and 100 mgrams. per cent, there is grave renal inadequacy calling for a stringent non-protein diet, and even then the prognosis is grave. The non-protein nitrogen of the blood at times shows a very high figure. Speaking generally, it may be stated that if the non-protein

nitrogen rises above 100 mgrams. per cent, the duration of the illness may be reckoned in days, seldom in weeks. Normally the cerebro-spinal fluid contains a concentration of nitrogen within 2 mgrms. per cent of that of the blood ; but changes lag somewhat behind changes in the blood. Studies of the relation of nephritic hypertension and the nitrogen content of the blood show that there is no definite relation between high blood-pressure and nitrogen retention ; very marked rise in blood-pressure may occur without any great nitrogen retention. Studies of the vital tests for renal functions are given, and seem to show that considerable nitrogen retention is possible with a fairly high phthalein excretion, whilst a low phthalein excretion may occur with a scarcely appreciable nitrogen retention. Nitrogen retention in the blood occurs slowly ; nitrogen estimation reveals the work which the kidneys have done for some time previous to the period of observation, while the phthalein test helps to demonstrate the capacity of the kidneys at the time of observation.

Treatment.—The treatment of nitrogen retention must be principally dietetic. When such a patient comes under observation it is well, if strength permits, to withdraw all nourishment, satisfy thirst with distilled water, and administer purgatives. **Hot-air Baths** and **Hot Packs** are of value. After twenty-four hours' rest, **Non-protein Diet** is commenced, consisting of water-arrowroot, cream, sugar, and such stewed fruits as are poor in benzoic acid, e.g., apples, prunes, figs, etc. This diet can be kept up for a week or even two weeks without the patient suffering. It supplies sufficient energies for the bodily requirements, and may cause a definite fall in blood nitrogen. At the end of the period, milk may be added, and more inspiring farinaceous foods than water-arrowroot. In the early stages of acute nephritis, even where there is no marked nitrogen retention, such a diet is always desirable, for even though the kidney may be able to evacuate waste nitrogenous material, in doing so it is working—not resting,—and work is not beneficial for an organ in an active state of inflammation. In chronic nephritis, dietetic treatment must largely be governed by an estimation of blood nitrogen. If there be no nitrogen retention, it is inadvisable to keep the patient on a too rigid non-protein diet, as nutrition suffers. Short periods of nitrogen-free diet are often useful and beneficial to the renal function and the cardiovascular symptoms, but the patient's nutrition must always be kept in view.

References.—[1]*Brit. Med. Jour.* 1916, 1, 278 ; [2]*Quart. Jour. Med.* 1916, Jan., 125 ; [3]*Brit. Med. Jour.* 1916, ii, 724 ; [4]*Lancet*, 1916, May, 996 ; [5]*Riforma Med.* 1916, Sept. 25 ; [6]*Brit. Med. Jour.* 1916, ii, 836 ; [7]*Amer. Jour. Med. Sci.* 1916, i, 149 ; [8]*Ibid.* 1915, ii, 655 ; [9]*N. Y. Med. Jour.* 1917, i, 46 ; [10]*Edin. Med. Jour.* 1916, April, 265.

NERVES, INJURIES OF. *J. Ramsay Hunt, M.D.*

Wilfred Trotter[1] relates his experiences with *gunshot wounds* of nerves. The problem of the restoration to the normal of an injured nerve presents certain peculiarities which distinguish it from all other similar tasks of plastic surgery. The interruption of a nerve leaves

a permanent defect in the physiological equipment of the body which cannot be overcome or compensated for by any other mechanism. There is no functional reserve to fall back upon like the collateral circulation of vessels or the compensatory hypertrophy of muscles. The restoration of a nerve to its normal anatomical continuity, although an essential preliminary to recovery, is by no means a guarantee of it.

He suggests the following as a tentative, and purely clinical, classification: (1) Intradural nerve injuries—almost entirely lesions of the cauda equina. (2) Peripheral nerve injuries: (*a*) Typical complete lesions of one or more nerve trunks: (*b*) Mixed lesions with complete division of some and incomplete division of other closely adjacent trunks—chiefly seen in the brachial and sacral plexuses, but especially the former; (*c*) Incomplete lesions without pain, usually due to combined bruising, laceration, scarring, and pressure: (*d*) Incomplete lesions with pain; (*e*) Pure pressure lesions, as from a prominence of bone or from a foreign body.

There is also a class of painful complete lesions not at all common and related to the so-called amputation 'neuromata.'

a. Typical Complete Lesions. The diagnosis is entirely a matter of anatomy and an exact knowledge of muscular function. There are three means of treatment—massage, electricity, and muscular relaxation—the last by far the most important. It is impossible to exaggerate the importance of relaxation of the paralyzed muscles in the treatment of nerve injuries both before and after operation.

b. Mixed Lesions are chiefly seen in the brachial plexus. A common picture is a complete paralysis of the plexus following on the injury—usually by a rifle bullet—then a gradual improvement which ultimately comes to a standstill, leaving an irreducible residue of symptoms.

c. Incomplete Lesions without Pain. In these cases we have a paralysis and defect of sensation which, under proper treatment, have improved but left a persistent residue.

d. Incomplete Lesions with Pain. There is an injury of a nerve trunk: and in the area of distribution, severe persistent pain arises either from the time of the injury or some weeks later. The motor loss of function is often profound, but the sensory loss is incomplete and accompanied by intense hypersensitiveness in the affected area, often with slight trophic changes in the skin.

e. Pure Pressure Lesions. This is a type of case which is apt not to be present itself as a nerve lesion at all. As the result of comminution or distortion of the bone, or of the presence of a piece of some projectile, the nerve—perhaps only during extreme movements—is stretched over some abnormal and resistant prominence.

Principles of Operative Treatment.

The peripheral nerves contain a tissue which has reached the body outside the cerebrospinal theca by a process of invasion: this tissue is in its very essence capable of irritating the non-nervous tissues and

being irritated by them. An essential accompaniment of nervous tissue everywhere outside the cerebrospinal axis will be mechanisms for insulating it from contact with the non-nervous tissues, except at those points where its stimulus action is necessary. The central nervous system, on the other hand, is insulated as a whole by a series of membranes, and by a special kind of lymph, the cerebrospinal fluid, which is remarkably isolated from the other fluids of the body.

Section of a nerve results in complex reactions between the central end and the surrounding tissues. There is a remarkable outgrowth of very numerous fine axis-cylinders, and a remarkable response of the tissues in the formation of a capsule of extraordinarily dense fibrous tissue round them—the so-called bulbous end. The picture presented suggests that the nerve fibrils were actively trying to invade the tissues, and the tissues were trying to ward them off by a process of encapsulation. It seems clear that this capsule is a tissue response to the contact of the nervous substance, and it is at any rate probable that the active outgrowth of the nerve fibrils is a response to the contact of the non-nervous tissues. A strong piece of evidence in favour of this view is the fact that regeneration of nerve fibres does not occur within the dura mater, and this applies as well to the nerves of the cauda equina.

Cauda Equina Lesions.—It is obvious that any attempt to secure regeneration of divided nerves of the cauda equina by suture must fail if the principles first laid down are correct. This opinion seems to be fully confirmed by experience. On the other hand, it must be remembered that it can never be determined by clinical examination how far the symptoms of such an injury are due to pressure, and how far to actual nerve division. The knowledge that regeneration cannot occur is therefore an argument for early operation in every case when there is the least suspicion of an element of pressure.

Technique of Peripheral Operations.—When the nerve has been exposed and dissected out of the scar, the extent to which its continuity is interrupted will have to be determined. In certain cases it will be obvious at once, from the disposition of the nerve, that it has been completely divided. In doubtful cases there will be three points to be taken into consideration: (1) The presence or absence of a bulbous end above the scar; (2) The presence or absence of a distinct longitudinal fibrillation of the scar; and (3) The effect of strong faradic stimulation above the scar. In Trotter's experience—operating at a period of about three months after the injury—the presence or absence of a bulbous end is by far the most important distinguishing character. The bulbous end should be freely excised.

In closing large defects in nerve trunks, when strong flexion of the limb is inadequate, there are only two alternatives—implanting both ends of the injured nerve into an adjacent trunk, or filling the gap with one or more lengths of some large cutaneous nerve like the internal saphenous. A great deal of care should be given to securing

the exactest possible coaptation of the sutured ends by the finest catgut. When the suture is complete, the junction should be wrapped in a layer of subcutaneous fat, which may well be a quarter of an inch thick, and should extend, if possible, for two inches on each side of the junction. The tube of fat should be secured to the nerve sheath at each end, and be securely stitched to make the insulation of the join as complete as possible. Fat is chosen as being an inert tissue which bears transplantation well, affords a mechanical protection of the nerve, and is perhaps comparatively non-irritating to the nerve.

Incomplete Lesions.—When it is decided that resection is not necessary, the nerve must be freed from the scar and carefully wrapped in fat. The most important points in the technique of nerve resection are free excision, exact coaptation, careful insulation, and perfect asepsis. Muscular relaxation before and after the operation is, perhaps, equally important.

Eve and Woods[2] review their experiences in the operative treatment of gunshot injuries of nerves in twenty-eight cases. In the absence of evidence of improvement, and if the electrical reactions indicate a severe injury of the nerve, they believe that an operation should be performed as soon as the condition of the wound permits of its being carried out aseptically.

In those cases in which resection was performed, the fibrotic tissue, or bulbous end, was removed on the proximal side until the section showed well-defined nerve bundles, and the distal end was refreshed. The ends were pierced with a round-shafted needle and united with one or (in the case of large trunks) two sutures of twenty-day chromic catgut—0 or 1 size. It was always found possible to get the ends together by freeing the nerve above and below, and flexing the nearest joint or adducting the upper arm. Where a portion of the nerve was thickened and appeared to be 'hidebound,' chiefly from thickening of the perineurium, an incision was made into the thickened tissue.

The chief point in the operative treatment of these nerve lesions is to determine whether simply to separate the injured nerve from the surrounding tissues, or to resect it, and this is of greater importance owing to the fact that anatomical division is comparatively rare. A definite indication is usually afforded by inspection. There may be evidence of complete division with union by a band of fibrous tissue, and in this case an enlargement of the proximal end will be present. Or the site of division, which may be partial or complete, is indicated only by a well-defined bulbous enlargement. In less severe injuries there is often a fusiform thickening of some extent involving the nerve trunk. In other cases, especially in injuries to the musculospiral nerve associated with fractures of the humerus, the nerve may be embedded in callus or stretched round a spicule of bone. The musculospiral nerve may be generally thickened and enlarged for some length.

Where doubt exists as to the advisability of resection, an indication of the amount of damage may be sometimes furnished by blunt dissection of the nerve bundles from above into the cicatrix, to ascertain if they are continuous across it. Electrical stimulation also furnishes important indications of the site and severity of the lesion. All cases except one were tested electrically. In practically all instances the paralyzed muscles did not react to faradization. They found the **Lewis-Jones Condenser** of great assistance, as it furnished a numerical equivalent indicating the degree of interruption to conduction through the nerve and the condition of the muscle. Further, the condenser gives reliable and easily recognized indications as to when cases of nerve lesions are improving under treatment.

Wilfred Harris[3] reports a similar series of cases. Special emphasis is placed upon the following points: The importance of an accurate history of the wound and of its immediate effects. A careful and methodical examination of the paralysis, both motor and sensory, to determine whether it coincides with the known anatomical distribution of one or more nerves, or of a portion of a plexus, or whether it resembles the phenomena produced in hysteria. Careful charts of the sensory loss are more important than the presence of complete muscular paralysis, with reaction of degeneration, in estimating the severity of the injury of a mixed nerve.

The various stimuli used in testing by hard or light pressure, pin-prick, scratch, camel-hair brush or cotton-wool, are tests of different degrees of conductivity of the nerve, not of different systems of fibre. Hard pressure will still be perceived except in total interruption of the nerve conductivity by actual division, or by its inclusion in dense scar.

Commencing recovery of sensation may in some cases be observed within a few days only of secondary suture of the nerve. Variations, however, in the sensibility must be allowed for, as this may vary from day to day within narrow limits, or according as the limb is warm or cold.

Roth,[4] Swan,[5] and Campbell[6] have also made contributions to this subject. Roth emphasizes the advantages of the **Lewis-Jones Condenser** over the usual types of faradic and galvanic batteries which are employed in testing the reactions of muscles. There are now several patterns of this apparatus obtainable. A series of ten capacities ranging from 0·025 to 3 microfarads, with a dial and switch for putting them in action, are mounted in a box, together with a metronome device for alternately charging them from a continuous current, the main, and discharging them into the patient's muscle. The current is kept down to 100 volts by means of the lamp and sliding contact resistance, controlled by the voltmeter. The dial has ten studs, numbered for convenience 1 to 10, No. 1, the lowest, putting into action the condenser with a capacity of 0·025 microfarads, and No. 10, the highest, that with a capacity of 3 microfarads.

If, when the electrodes are applied to it, a muscle reacts to one of

the first three studs, it is considered normal electrically, and the nerve supplying it is healthy; if only to one of the next four, it shows the reaction of incomplete degeneration, and the nerve supplying it is partially injured; if only to one of the last three, complete reaction of degeneration is present, and the nerve is so badly damaged that no impulses whatever pass along it. In practice we entirely drop the terms 'faradic' or 'galvanic' stimulation, reaction of 'complete' or 'incomplete' degeneration, as being of little value, and instead refer to a muscle as acting at so many microfarads, or at such and such a stud on the dial.

This instrument has three uses: (1) For diagnosing which muscles are cut off from their nerves, and determining their excitability in measurable terms; (2) For testing by observations made with it at fixed intervals of time whether the lesion is recovering, remaining stationary, or progressing; (3) For daily treatment. (*See also* ELECTROTHERAPEUTICS p. 54.)

The various operative indications based upon the *histological study of injured nerves* are discussed by Marie and Foix.[7] They refer to the differences of opinion on the question of how and when to operate after nerve injuries, and have approached this question from the standpoint of the various types of histological changes found. The following types of histological lesions are recognized, of which the first three are regarded as primary or essential, the remaining four being sub-types.

1. *Complete or Practically Complete Division of the Nerve Trunk.*—In this form a neuroma forms on the end of the superior trunk and a pseudoneuroma on the inferior trunk. This formation is larger and more marked on the upper trunk. The operative indication is the removal of the extremities of both neuromata, and this should be especially free if the end of the upper stump is twisted.

2. *Pseudoneuroma of Attrition.*—In this form the site of the injury is indicated by a swelling of the nerve-trunk with preservation of continuity. The injured segment of the nerve-trunk is converted into a small fusiform neuroma. There may even be evidences of a small lateral cicatrix. If such a lesion is encountered at operation, the nerve-trunk should be spared, no matter what the nature of the clinical symptoms. In brief, no resection of nerve tissue in such a case.

3. *Lateral Notching of the Nerve.*—This is a form of partial division of the nerve-trunk, and is characterized by the formation of neuromata, the superior tip being larger and better developed than the smaller. *Operation*: the sclerotic tissue should be excised, care being exercised not to injure the healthy bridge of nerve tissue.

Sub-types.—Complete division, with :—

a. Pseudo-continuity is a special form of Group *a*, but in which the neuromatous stumps of the divided nerve are united by a bridge of fibrous or scar tissue.

b. Lateral pseudoneuromata, with or without small lateral notching.

c. Partial neuroma, intra- or juxta-neural. This is an isolated, sharply circumscribed, neuromatous formation in the nerve-trunk. It may be central or parietal in localization, and histologically may be a pure neuroma or false neuroma. The neuromatous tissue may have a fibrous character. No attempt should be made to remove this type of lesion.

d. Simple induration of the nerve-trunk is occasionally met with. There is a general swelling and thickening of the nerve, but without gross lesion of continuity. No resection should be attempted under such conditions.

The treatment of the nerve injuries of warfare is reviewed in some detail by H. Platt.[8] It may be conveniently considered in four stages: (1) Preliminary treatment for all nerve injuries; (2) Commencing recovery of motor power; (3) Stationary, no signs of recovery; (4) Irrecoverable lesions, partial or complete.

Stages 1 *and* 2.—The actual wounds, if unhealed, will be treated along well-recognized lines. The one absolute essential in all forms of lower-neuron paralysis is the **Fixation of the Limb** in such a position as to maintain the paralyzed muscles in a state of relaxation. This vital principle is still unappreciated by many surgeons and neurologists. A splint must be adjustable, comfortable, and as light as possible. There are three useful forms of apparatus, viz., malleable metal splints (sheet iron or aluminium), plaster-of-Paris shells, and celluloid splints. When the paralysis is so extensive as to involve muscle groups which are antagonistic, then standard positions have to be adopted in which the more important muscles are favoured. Muscular relaxation is the sheet-anchor in the treatment of all lower-neuron paralysis. All other manœuvres are merely adjuncts. A paralyzed muscle which is continuously stretched cannot recover even when the nerve block is removed.

Massage must be carried out in the position of muscular relaxation. The application must be entirely superficial, the effort being directed solely towards the maintenance of nutrition of the soft parts of the limb. Deep kneading applied to a muscle or group of muscles which are for the time being cut off from their governing nerve-cells is exceedingly harmful. **Muscle Training** is introduced as soon as there is a sign of the return of motor power. The recovering muscle is first assisted through a small range of movement; then, as power increases, active movements are performed against slight resistance. Both the range of action and the load are gradually increased as recovery proceeds.

Electricity as a treatment for paralysis is exceedingly popular. Although it has legitimate exponents, a great deal of electrical treatment in cases of paralysis is at least empirical. The adequate physiological stimulus to a muscle is a motor impulse from the cerebral cortex.

Stage 3.—No sign of motor recovery after period of conservative treatment.—It is not easy to fix a time limit beyond which it is unwise

to persist with non-operative treatment in a case which is completely stationary. Three months at least should be the minimum time allowed for conservative measures, and at the end of this period the features of the case should be reviewed again. As a maximum time, six months for the smaller trunks and nine months for the plexus and sciatic lesions, can be taken as a sound working scheme.

Exploration of the damaged nerve is now indicated. Two types of injury are encountered—the incomplete and complete anatomical lesions of a trunk, with varying degrees of perineural changes which may or may not be producing compression symptoms. In the first type the nerve-trunk should be freed from any compressing scar or bony tissue, and a new fascial sheath provided. Where there has been complete division of a nerve with great loss of substance, no spontaneous recovery could ever be expected. The proximal and distal ends can generally be found and approximated after removal of the end bulb and perineural scars. If the gap be too extensive, a bridge formed by a nerve-graft taken from a sensory nerve, or by a simple fascial tunnel sutured to the two ends, must be employed.

Stage 4.—This includes the following types: (*a*) Irreparable paralysis, complete or residual; (*b*) Failure of recovery after plastic nerve operations: it is becoming evident that the number of such cases will be not inconsiderable; (*c*) Where an existing joint injury so impairs the efficiency of the limb as to neutralize the effect of any recovery in the paralyzed muscles The operative measures to be employed are **Tendon Transplantation, Tendon Fixation** (tenodesis), and **Arthrodesis** according to the local needs. The indications, methods, and technique for these operations are the same as have been firmly established in the operative treatment of infantile paralysis.

A New Method of Uniting Divided Nerves.—Edinger[9] has found that there is often great difficulty in the union of the ends of severed nerves. The regenerated nerve-fibres which are thrown out by the ganglion cells are diverted from their course by any mechanical obstruction, such as a blood-clot, and union between the stumps is prevented. The regenerated fibres may be kept in the proper direction by permitting them to grow in a tube. The attempts made to grow nerve-fibres in tubes by previous workers did not give good results, because it was necessary for the fibres to be surrounded in the tube by a suitable environment for growth. The various experiments of Edinger demonstrated that human nerve-fibres grow best when the two disunited ends are inserted in an artery filled with **Agar Jelly**, and he advocates this new procedure. A number of such tubes have been prepared and distributed for use to operating neurologists.

Sheaths for Nerves after Suture.—To prevent adhesions with surrounding tissues, the nerve after suture must be invested with an artificial sheath. Bittrolf[10] carried out experiments on dogs, with the following results: When the nerve was sutured and no sheath put around it, in three months it was surrounded by thick scar-tissue.

When a sheath was made of calves' arteries, the nerve was free, but the artery was loosely adherent to the surrounding tissues. Muscle-flaps became transformed into scar-tissue, to which the suture place was adherent. Fat-sheaths protected the sutured nerve, but became adherent to the surrounding tissues. Treatment with Röntgen rays after the nerve had been sutured and sheathed in these various materials had no visible effect. When a sheath was made of a celluloid-like material, it healed by first intention and the nerve remained freely movable.

Operative Treatment of Gunshot Injuries.—Schiffbauer[11] gives the results of an extensive experience with gunshot injuries to the peripheral nerves. As indication for operation he gives the presence of completely severed nerves, which may be recognized by the absence of motor, sensory, trophic, and vasomotor functions. He states, however, that it is necessary to wait at least three months before a definite diagnosis is possible that the nerve has been completely severed. After the positive diagnosis is possible, operation should be performed without delay, because the earlier the operation, the better are the anatomical relations maintained. The scar-tissue is then present in small amount; it is soft and easily removed. He also points out other bad results in case the operation is long postponed, such as compression of the nerves by callus or scar-tissue, the increase of scar-tissue because of the presence of foreign bodies, deformities of the joints, and contraction of the healthy muscles, as well as the occurrence of many trophic changes.

A definite technique of operation is described, of which the principal points are perfect coaptation, prevention of hæmatoma, and early passive motion. All operations are performed without the Esmarch constriction. All scar-tissue is carefully removed. The nerve-ends are carefully mobilized, and perfect coaptation is accomplished by suturing the perineurium with very fine silk. After this the nerve is placed in a new muscle-bed free from scar-tissue. Special care is taken to guard against tension.

Robert Jones[12] discusses the question of **Tendon Transplantation** as an alternative measure in cases of inoperable nerve injury.

In cases of musculospiral injury the deformity is a drop-wrist, with loss of the power of extending the fingers. The uncontrolled action of the flexor group causes the fingers to curl into the palm, and the hand to become useless. In such a case, (1) The flexor carpi radialis and the flexor carpi ulnaris can be transplanted into the paralyzed extensor of thumb and fingers: and (2) In addition, the pronator radii teres may be affixed to the two radial extensors.

In cases of complete and irreparable paralysis of the muscles supplied by the median nerve, the only active muscles on the flexor aspect of the forearm are the flexor carpi ulnaris and the inner half of the flexor profundus digitorum.

In median paralysis, (1) The outer tendons of the flexor sublimis are inserted into the inner tendons of the flexor profundus digitorum;

(2) The inner tendons of the flexor sublimis are inserted into the tendon of the flexor carpi ulnaris. The extensor carpi radialis longior is attached to the flexor longus pollicis.

In complete paralysis of the ulnar, the two inner tendons of the flexor profundus are attached to the two outer. The palmaris longus is inserted into the tendon of the flexor carpi ulnaris.

In paralysis of the anterior crural nerve, transplant the sartorius and biceps into the patella. An alternative measure would be the application of a knee-cage with an extension spring to take the place of the paralyzed quadriceps. This should be worn permanently.

In paralysis of muscles supplied by the external popliteal nerve, the anterior group of muscle and the peronei are paralyzed. The deformity is a dropped foot with varus due to gravity and the uncontrolled action of the muscles attached to the tendo Achillis and of the tibialis posticus.

In cases of more extensive paralysis there is not sufficient muscle power remaining for it to be effectually distributed; there is, so to say, not enough power to go round. **Tendon Fixation** is then the best operative procedure, for it establishes a firm barrier against drop-foot, and yet allows useful mobility. The object of tendon fixation is to utilize the tendons of completely paralyzed muscles as accessory ligaments to hold a paralyzed foot in a correct position.

An apparatus for the *correction of wrist-drop* is described by Goullioud.[13] This consists of two parts, one of which is laced to the forearm, the other supporting the hand and fingers, thus permitting movements of prehension in cases of musculospiral palsy. It is so arranged that the parts may be removed separately, for convenience in washing the hands, etc. This mechanism was devised by Lieutenant Canet, and is called the 'Poignet-Canet.'

Nerve Operations in Perforating and Varicose Ulcers of the Leg.—The value of **Nerve-stretching** in the surgical treatment of trophic disturbances was first brought into prominence by Chipault. The procedure consists of stretching and sometimes laceration of the nerve-trunk. This is supposed to influence trophic manifestations through the medium of the vasomotor and trophic fibres of the nerve-trunk. Nerve-stretching is a less drastic operation than splitting up the nerve into its constituent fibres (nerve laceration), or than direct interference with the sympathetic nervous system. In the last procedure, localization is more difficult, the operation is more dangerous, and the results are uncertain, whereas they have already been shown to be successful in the cases of nerve-stretching and laceration.

Smits[14] reports his results by the use of this method in twenty-five cases of *perforating ulcer of the foot*. In all, a general medical and surgical treatment was carried out before any operative procedure was attempted. Only when this treatment did not result in healing, was stretching or laceration of the nerve-trunk performed in the region of the ulcer. The operation was always accompanied by thorough surgical treatment and the extirpation of all diseased tissue.

If this operation proved insufficient or there was a relapse, the nerve operation was repeated at a higher level, generally with nerve-laceration. In this way thirty-three operations were performed in twenty-five patients, by which the mala perforantia were finally cured. Smits states that the mere local surgical treatment was shown to be useless in all these cases, even when combined with an absolute rest-cure, and that the same surgical treatment combined with a nerve operation, whether executed once or repeatedly, always led to cure.

The same procedures are also recommended in *chronic varicose ulcers* which are far advanced and which do not yield to the usual methods of treatment.

REFERENCES.—[1]*Lancet*, 1915, ii, 1023; [2]*Ibid.* 1021; [3]*Ibid.* 1915, 1073; [4]*Clin. Jour.* 1916, May, 161; [5]*Lancet*, 1915, ii, 1081; [6]*Pract.* 1916, 62; [7]*Presse Méd.* 1916, Jan., 41; [8]*Clin. Jour.* 1916, 285; [9]*Surg. Gyn. and Obst.* 1916, ii, 49; [10]*Ibid.* i, 514; [11]*Ibid.* 615; [12]*Brit. Med. Jour.* 1916, i, 679; [13]*Lyon Chir.* 1916, May–June, 515; [14]*Ann. Surg.* 1916, i, 561.

W. I. de C. Wheeler, F.R.C.S.I.

Robert Jones[1] points out that although the conductivity of a nerve may be restored, the functions of the muscle and joint may not be regained because certain fundamental principles had been neglected. He implies that it is unreasonable to expect recovery of the conductivity of nerves if the tissues supplied by the nerve are not in a suitable condition to receive impulses. Conditions precedent to the late suture of a nerve must be: (1) Correction of contractures of skin or muscle and all the anatomical constituents from skin to bone; (2) Freeing of the joints from all adhesions, and restoration of mobility where ankylosis is threatened; (3) Maintenance of the paralyzed muscles in a position of relaxation throughout the period of recovery; (4) Massage, without once allowing the relaxed muscles to be stretched. If the muscles are not freed, they cannot respond to stimuli sent to them through the nerve, and therefore cannot in their turn send the answering afferent impulse which is necessary to bring the apparatus into proper working order.

REFERENCE.—[1]*Brit. Med. Jour.* 1916, i, 641.

NEURALGIA AND NEURITIS. *J. Ramsay Hunt, M.D.*

About seventy-five years ago Valleix wrote a treatise on neuralgia and described its painful points. He used a classical grouping of neuralgias which has continued in literature ever since; but as experience has increased and neuropathology becomes a more accurate science, the importance of these old neuralgic formulæ has diminished. Its place has been taken in a degree by the term neuritis, which has of late become a common disease; but, unfortunately, neuritis is a term now used with as little definiteness of knowledge as neuralgia. Inflammation of nerves, to be sure, is not very rare, but one cannot have neuritis without some of the cardinal symptoms—muscular weakness, wasting, reaction of degeneration, objective sensory disturbance, and tenderness along the nerve. Reflex pain is frequent,

and is a legitimate diagnostic term, but it has not the darting paroxysmal character of neuralgia or the objective symptoms of neuritis.

Charles L. Dana[1] discusses the question of *periostitis* and *osteitis* as a cause of so-called neuritis and neuralgia, based upon a series of clinical observations, reinforced by *x*-ray findings, serological tests, and the results of vaccine therapy. The chief causes of periostitis are syphilis, tuberculosis, infections like typhoid fever, trauma, and rickets. Many obscure and persistent pains which are usually attributed to rheumatism, neuritis, myositis, or arthritis, probably have this origin, and may be explained on a periosteal theory. Periosteal and bony irritations are extremely painful affairs. Dana describes four cases in which the clinical evidence and the *x*-ray and laboratory findings indicated the existence of localized areas of periostitis and osteitis on the bones of the pelvis or lower extremities. The pain and incapacity in all the cases were of long duration, and the source of the infection was obscure. In one instance the *x* ray demonstrated the existence of abscesses at the roots of the teeth.

Intraneural Injections of Alcohol in the treatment of painful *neuritis* (causalgia) after gunshot wounds is the subject of an interesting communication by J. A. Sicard.[2] Twenty-one cases were treated by this method, and all were types of traumatic neuritis associated with excessive and intractable pain. They were not examples of ascending neuritis, but were purely local. More than one nerve was occasionally affected, and there were also examples of plexus involvement (plexalgia). No special reason could be assigned in explanation of the atrocious pain in many of these cases. The macroscopic and even microscopic appearance of the nerve does not differ essentially from that of many other cases in which the lesions were practically painless. The median nerve was most frequently affected, and next in order followed the sciatic, crural, ulnar, and rarely the radial. The pain in some of these cases suggested the severe pain of tic douloureux, with its psychical, secretory, vasomotor, and even spasmodic accompaniments. Many other forms of treatment had been tried, both medical and surgical, with but transient results.

The technique is simple. Under general anæsthesia the lesion is exposed and the nerve-trunk is carefully disengaged from the surrounding tissue. The injection must be made 3 to 4 cms. above the upper limits of the nerve lesion or cicatrix. A fine needle is used, and 1 to 2 c.c. of sterilized alcohol (60 to 80 per cent) is injected into the substance of the nerve. It is imperative that the alcohol permeate the entire cross-section of the nerve, and it may be necessary to inject in more than one place. A dilution of less than 60 per cent is not suitable for these severe cases. It is absolutely necessary that the injection be made *above* the lesion of the nerve or, if the case has been previously operated, above the site of operation. It is also necessary to inject any of the tributary branches of the trunk which arise in the painful area.

By this method Sicard has obtained very brilliant results, as have also many of his colleagues. He notes the interesting fact that in a few cases a curious paradoxical recuperation of motor power followed the injection, probably due to paralysis of the irritated sensory nerves which had inhibited the motor power. Of course, by this method, paralysis of the motor fibres usually followed. This, however, could not be regarded as a contra-indication to the procedure, because of the very atrocious and intractable pain. Laboratory experiments have shown that the motor paralysis after alcohol injection is not permanent, but that restoration of function follows in from eight to ten months.

Urban Maes[3] presents an exhaustive review of the surgical treatment of *tic douloureux*. He considers in detail the history of the development of this field, the results obtained, and the advantages of the different methods advocated. While mere section of the nerve suffices in some of the early cases of simple neuralgia, it can scarcely be considered a permanent means of relief in the patients suffering from the major forms of true tic douloureux, especially when associated with spasm of the facial muscles and vasomotor phenomena. The period of relief varies, and in a series of forty-three cases reported by Putnam and Waterman, the average freedom from pain was about ten months.

The **Thiersch Avulsion** with a blunt forceps so as not to crush the nerve, after anatomical exposure, followed by plugging the canal to prevent regeneration, gives better results. Various methods of plugging have been suggested. Amalgam, gold, and silver foil have all been used, with varying success.

The more radical treatment of trifacial neuralgia dates from the suggestion of J. Ewing Mears, of Philadelphia, who in 1884 proposed **Extraction of the Gasserian Ganglion** for the relief of this class of sufferers. Adopting the suggestion of Mears, Rose performed the first successful removal of the Gasserian ganglion in 1890. The extracranial operation, which is known by the name of Rose, its originator, was not destined to survive, and soon valuable suggestions in the evolution of a perfected technique came from the clinics of Horsley, Hutchinson, Hartley, Krause, Doyen, Keen, Lexer, Cushing, Abbe, and Frazier. The earlier writers were all in favour of more or less complete removal of the ganglion. Realizing the dangers of complete gasserectomy, Abbe suggested section of the second and third divisions at their foramina of exit, and the interposition of rubber tissue to prevent subsequent regeneration.

Aside from the technical difficulties, the mortality and recurrence are to be considered. In other words, Is the operation worth while as a therapeutic means of dealing with so deplorable a condition? In a series of 230 cases from the clinics of Horsley, Lexer, Dollinger, Cushing, and Frazier, the mortality was 3·7 per cent. This figure is rather low, and it must be remembered is from the most expert operators in this field. In Tiffany's collected series of 108 cases the mor-

tality was 22 per cent. While this seems high, the average would be somewhere in the neighbourhood of the general surgical mortality from gasserectomy. When we take into consideration the age and debilitated condition of this class of sufferers, the mortality is no higher than after any other formidable surgical operation. In 201 cases collected by Turek, 85 per cent recovered from the operation. Recurrence does not seem to be a serious consideration if the operation is properly performed.

In Lexer's 201 cases there were 93 per cent permanent cures. The most frequent complication is the neuroparalytic keratitis which may follow gasserectomy. The risk of this very disagreeable incident may be minimized by avoiding injury to the facial nerve. After division of the second and third branches only, keratitis is not seen, and as the first division is the seat of pain in less than five per cent of the cases, this branch may be spared in most instances. Injury to the third, fourth, and sixth nerves near the inner aspect of the ganglion must be carefully guarded against.

As already mentioned, the consensus of opinion among most surgeons is that Frazier's method of approach, combined with Spiller's suggestion of division of the sensory root, is probably the most practical of the present-day operations. The advantages of this method are: (1) Approach is more posterior, and is therefore less likely to involve the upper fibres of the facial. (2) A comparatively small opening diminishes the liability to hernia. (3) Special technique of dealing with the middle meningeal artery should be noted. (4) Division or avulsion of the sensory root only, with less frequent occurrence of the distressing neuroparalytic keratitis. (5) Cerebral complications have been far less frequent than formerly. (6) If the sensory root is not easily recognizable, we can always have recourse to one of the other suggestions, such as complete removal of the ganglion, or section of the second and third divisions.

Injection of Alcohol into the Gasserian ganglion is the final achievement in the treatment of tic douloureux. The technique suggested by Härtel is, after anæsthetizing the cheek, to push the needle inward and backward, care being taken to avoid entrance into the mouth by keeping the finger (index of hand not in use) on the inside of the cheek. The point of the needle is made to come in contact with the os planum on the under surface of the sphenoid, and is gradually made to move backward when it engages in the opening of the foramen ovale. It is essential that one recognize this smooth infratemporal surface in front of the foramen. This is safe territory, and the rough bone back of the foramen is fraught with danger. According to Härtel, the needle points to the pupil of the eye of the same side, and on lateral view the needle points to the articular eminence on the zygoma when the skull is viewed from the front. In other words, the location of the foramen is at a point on the base of the skull where a perpendicular plane through the centre of the pupil and a horizontal plane through the articular eminence bisect.

Härtel has made careful measurements of the size of the foramen ovale, and found it to vary in length from 5 to 11 mm. (average 6·9 mm), and with an average width of 3·7 mm. The average depth of the canal is about 1 cm. The runner is placed at the 6 mm. mark on the needle, and this distance must not be exceeded unless the operator is certain of his surroundings, which certainty can only be acquired after long practice on the cadaver. As the needle ceases to impinge against the bone and enters the foramen, the loss of resistance is felt, and the patient complains of pain in the distribution of the third division. The needle is pushed in 1·5 cm. farther when pain is complained of in the distribution of the second division. The introduction of 1 c.c. of 1 per cent novocain solution at this point (Matas) should produce anæsthesia of the entire trifacial distribution. After testing the anæsthesia, with the needle in situ, and feeling sure of the location, we may now inject 1 to 2 c.c. of 80 per cent alcohol. If the preliminary injection of novocain has not been made, the patient complains of intense pain at this stage, and may even start or jump so as to move the point of the needle and cause some of the untoward results of too deep an injection. Some burning may be complained of, even after the preliminary use of novocain, but usually the anæsthesia is complete and lasting. However, a return of pain is a call for re-injection, which, if properly done, gives lasting benefit. In patients with bilateral involvement, there should be a long interval between injections in order to watch the effect on the cornea.

In Maes' estimation, direct alcoholization is equivalent to a gasserectomy as far as immediate physiological effects are concerned. The effect of alcohol on the ganglion is gradual, and because of this the immediate bad effects of gasserectomy are not seen. Härtel, after his first ten injections, saw two develop keratitis. In his twenty-seven cases re-injection was rarely necessary.

We are justified in concluding that the injections into the large nerve-trunks of 80 per cent alcohol offer a safe and usually certain means of relieving painful affections involving the fifth nerve, and that the direct alcoholization of the Gasserian ganglion offers a means of curing tic douloureux which is devoid of the usual dangers accompanying intracranial operations on the ganglion.

Elderberry recommended in primary neuralgia by Vetlesen, p. 16. Budden praises **Ionization,** p. 55.

References.—[1]*Med. Rec.* 1916, No. lxxxix, 765; [2]*Presse Méd.* 1915, 520; [3]*Surg. Gyn. and Obst.* 1915, xxi (Internat. Abst.), 349.

NEUROFIBROMA. *W. I. de C. Wheeler, F.R.C.S.I.*

Owen[1] discusses the condition known as painful subcutaneous neurofibroma, with which the names of Brody, R. W. Smith, and Paget have been historically associated. These little growths are usually found in the extremities. They have a well-defined capsule, and are freely movable over a wide area. They are found more often

in women than in men. The pain is radiating and neuralgic, and is increased on palpation; it is not continuous, but paroxysmal. The tumours are exquisitely tender. They are variously classified under the terms fibromata and neuromata, and are connected with a sensory filament of a cutaneous nerve. Very rarely the tumours become malignant, with an involvement of the neighbouring lymphatics. True neuromata are usually multiple, but the painful subcutaneous tumour is nearly always single. The former more frequently occurs in women, the latter in men. It is to be noted that Paget, Cooper, and Tait reported cases in which the tumour recurred after removal. Owen suggests that before operation for excision, the tubercle should be fixed with a needle, as sometimes, owing to its great mobility, it is difficult to find when the incision is made.

REFERENCE.—[1] *Ann. Surg.* 1915, i, 451.

NEUROSES OF THROAT AND EAR. (*See* THROAT AND EAR, WAR NEUROSES OF).

NODULE, PAINFUL SUBCUTANEOUS. (*See* NEUROFIBROMA.)

NOSE, DISEASES OF. *J. S. Fraser, M.B., F.R.C.S.*

Rhinophyma.—Milligan[1] thinks that rhinophyma (potato nose) is the result of acne rosacea. In the case which he describes, he made an incision down the centre of the dorsum of the nose, and two lateral incisions round its side, and, with a very sharp knife and razor, stripped all the lobulated and hypertrophied tissue from the side of the nose, being careful not to injure the cartilages. During the dissection the nose was plugged with pledgets of wool to keep it distended. A skin-graft was taken from the patient's leg to cover the whole raw surface immediately. Milligan then covered the graft with gold-leaf and put on a simple dressing, fixing it with plaster. After five days it was found that it had taken completely. On microscopical examination, the specimen showed a deposit of fat in the subcutaneous tissue. There was interstitial hyperplasia, the blood-vessels and lymphatics were enlarged, and there was an enormous dilatation of the sebaceous glands.

Submucous Resection of the Septum in Children.—Hayton[2] summarizes as follows: (1) 92 per cent of the parents of the children operated on bore straightforward testimony to the great benefits derived in regard to the general health and the nasal breathing of the child. (2) A certain amount of physical deformity appears to have followed the operation in 35 per cent. (3) The great benefit derived from the operation in regard to the health of the child overshadows the slight cosmetic defects that were complained of. These could be remedied by paraffin injections.

Rhinoplasty.—Lee Cohen[3] divides deformities of the nose into two classes: (1) Idiopathic or congenital; (2) Acquired. A further subdivision is generally made into those affecting (*a*) the bony and

(*b*) the cartilaginous portions. In correcting these deformities he points out that the main object should be to avoid marring the subsequent appearance of the nose by scar. For this reason incisions should be made within the vestibule of the nose, generally above the lower lateral cartilage of the left side (and subsequently, if necessary, on the right side), cutting through the mucous membrane and the cartilage to the under surface of the skin. It is surprising with what ease one can, with a very small straight knife, undermine the skin over the entire nose through a small incision on one side. By following the course of the knife under the skin with the index finger on the outside it is not difficult to avoid injury to the skin. One proceeds with the subsequent steps of the operation, working under the skin as if it were a tent, and guiding the movements of the various instruments with the left hand over the outside of the nose.

Rhinitis.—Hill[4] says that 'colds' are most common when the humidity of the atmosphere is great and the temperature variable, also when the weather is raw, with thawing snow, or strong winds, or when the ground is wet. Men living open-air lives are free from 'colds,' i.e., sailors on long voyages, arctic travellers, troops at the front. The health of the Navy at sea in war is better than in peace : the sailors are far less exposed to temptation to over-indulgence and to infections from the civil population in port. When children return to school after the holidays, epidemics of 'cold' usually begin. Propinquity is required in order that the infected spray of nasal secretion or saliva sneezed, coughed, or spoken out, may be transferred from a 'carrier' to another victim. Thus exposure, even to extreme cold, by itself does not occasion 'colds' or pneumonia. The incubator chick is not so robust as the one hatched by the hen ;, so it is with the child coddled in heated rooms at home and at school. Acute rhinitis—the 'common cold'—may be caused by bacterial infection, by dust, by a chemical irritant—e.g., sulphurous acid or chlorine—or by the pollen of certain grasses. There is also a class of people which suffers from a nervous derangement of the nasal membrane—vasomotor rhinitis or paroxysmal rhinorrhœa. A draught may provoke in these an acute paroxysm.

Under what conditions does chilling of the feet inflict punishment on the nasal membrane ? Cool breezes blowing round the head, the radiant heat of the sun, and a warm ground to stand on are the ideal outdoor conditions. The mucous membrane of the nose under these conditions appears pale and taut. Indoors, when the feet are chilled by draught blowing over a cold floor, and the head is immersed in warm stagnant air, the nasal membrane appears swollen, congested, and covered with thick secretion. This causes the stuffiness in the head and the headache felt in crowded, overheated places. A bad condition is a room with a gas fire not fitted with a flue, so that all the heated air escapes into the room and rises. The ideal method of warming and ventilating rooms would give us abundant radiant heat, a warm floor, and agreeable movement of cool air.

Such conditions are found in one-storied foundries. Radiators and artificial lights make warm and humid the upper strata of rooms, and afford conditions bad for the nose. Inhaled bacteria will be caught by swollen mucous membrane covered with thick secretion. If subjects go outside again into the cold air, the congested nasal mucosa at once becomes pale, but remains swollen and boggy. The washing away of bacteria by the outflow of secretion must be one of the most important methods of defence.

Air saturated at body temperature holds 19 gr. of water vapour per cubic foot. At 30° it holds only 1·9 gr. The rapid increase in the containing power of the air, as the temperature rises, enables us to keep our bodies cool. In the spinning mill at 75° (saturated) the evaporation is about 42 per cent less than out of doors on a wintry day. On changing suddenly from this warm atmosphere to the cold outdoor conditions, a much greater supply of blood is required to keep the nose warm, and a greater passage of lymph to keep up the evaporation in the cold outdoor air. Sudden changes from overhot, humid rooms, to raw wintry weather strain the vasomotor and secretory mechanisms and help to cause 'colds.' Raw wet weather impels us indoors, and makes us shut up windows and crowd in heated rooms. If the temperature within the nose is to be maintained almost at body temperature in wintry winds, much more blood must flow through the nasal membrane per minute. Taking exercise out of doors on a cold winter day and breathing 40 litres per minute, a man may lose 4 to 5 large calories of heat per minute in warming the air he breathes, against 0·38 sitting in a room at 65°. We see, then, how much more blood is required to keep the nose warm in the outdoor conditions. Herein lies one explanation of the benefit of open-air exercise, sleeping in the open air, etc. The greater circulation through, and the greater evaporation from, the nose, together increase its immunity to infection. Nasal secretion is very greatly increased in cold air: it is a common observation that exposure to cold wind makes the eyes water and the nose run.

Cocks[5] holds that we may discard the chemical constituents of the air as of no great importance. The effects of poor ventilation can no longer be explained by the presence of volatile organic poison in the air. The principal factors are humidity and air movements. The bad effects of poor ventilation are due to the inability of the body to cool itself because of the increased temperature and moisture of the surrounding air. The capacity for heat regulation depends largely upon the vasomotor system and the sweat glands. The amount of heat lost from the surface of the body by radiation and conduction depends upon the temperature of the surrounding air, the amount of heat lost by evaporation upon the humidity. Resistance to infection is supposed to be influenced by cold. Pasteur found that although the common fowl is not susceptible to anthrax, it becomes susceptible when made to stand overnight with its feet in cold water. Rabbits and guinea-pigs chilled in various ways are

much more susceptible to inoculation with bacteria than control animals. Vasomotor contraction of the skin-vessels due to cold is accomplished by reflex dilatation of vessels in other parts of the body. Severe muscular exertion in hot, bad air leads to active dilatation of the vessels of the respiratory mucous membrane, and if there now follows a sudden exposure to cold, a condition predisposing to catarrhal inflammation is produced. Mueller has noted vascular stasis in an exposed part subjected to severe cold, and found that the blood undergoes chemical changes, resulting in the disseminating of poisonous products.

Cocks has experimented with two rooms so arranged that any desired degree of temperature and humidity could be secured. He considers the normal temperature to be 68°, normal relative humidity 50 per cent ; cold room temperature 50°, relative humidity 50 ; hot dry room 80° to 86°, relative humidity 20 to 30 ; hot moist room 80° to 86°, relative humidity 80. He found that a large proportion of workers in hot moist rooms (steam laundries) suffered from atrophic rhinitis. In passing from a normal or a cold room into a hot one, there usually results an increase in colour, moisture, and size of the inferior turbinates and of the nasal mucosa generally. Conversely, on going from a hot or normal room into a cold one, there is a decrease. The second series of experiments was made to demonstrate the effect of a current of air blown directly upon the face, i.e., to obtain information concerning the effects of draughts on the nasal mucosa. Most of the cases showed a reduction in size of the turbinates and decrease of secretion on passing from a normal room to a hot room in which electric fans were working. On going from a hot dry room to a cold room in which a draught was created, there was, on the other hand, an increase in the size and moisture of the nasal mucous membrane. As a result of his experiments, Cocks concludes that the theory of bacterial infection as the sole cause of catarrhal inflammation of the upper air-passages is not tenable.

Voorhees[6] thinks that medical men have neglected the pathology and treatment of 'colds' in the nose, larynx, and lower air-passages. Perpetual warfare ought to be waged against the universal ignorance of those who cough and sneeze in public places without protecting the face with a handkerchief. When a cold is once under way, what can be done to shorten its course or to prevent its spread to others ? Quinine, belladonna, calomel, and cough mixture are taken. This upsets the stomach. Local treatment has consisted of sprays and inhalations. **Vaccines** are also indicated when the predominating germ can be isolated. In singers who 'simply must go on,' Voorhees recommends intratracheal injection of 5 to 25 per cent **Menthol in Liquid Paraffin,** after the pharynx, larynx, and trachea have been sprayed with cocaine. This should be carried out twice daily. About 1 to 2 c.c. of the menthol solution are usually quite sufficient. Some patients complain rather bitterly of burning, so that it is important to explain beforehand just what is likely to take

place. In acute bronchitis this treatment is very effective. In acute rhinitis the patient is asked to lie down with the head far extended over the edge of a couch, and the menthol drops (5 per cent) are instilled into the nose with a dropper. If the nasal mucosa is greatly swollen, it must be sprayed first with a cocaine-adrenalin solution in order to shrink the erectile tissue. In pharyngitis, one should apply the menthol-oil solution by means of a post-nasal applicator.

Garlic advised in acute coryza, p. 19.

Peiper[7] finds that in cases of *influenza in babies* the nose is occluded by the second or third day. Respiration is very rapid, and nursing almost impossible. In the newly-born, acute rhinitis is a menacing condition. If the nose is obstructed with crusts, the latter must be softened with **Olive Oil**, to which **Menthol** should be added (½ per cent). Weak antiseptic and astringent solutions must be introduced on pledgets or by means of a camel's-hair brush. For antiseptics, **Hydrogen Peroxide** or weak **Boric Acid** should be used. A little **Suprarenin** should be added. Purulent discharge suggests that nasal diphtheria is present. Acute rhinitis may extend backward and produce a rhinopharyngitis, usually accompanied by angina. Packs for producing sweating are of much value in rhinopharyngitis. After a cool bath, the child is wrapped in a wet bath towel covered with flannel, and hot-water bottles are applied. The presence of deep-seated inflammation is usually made evident by swelling of the lateral chain of cervical lymph-nodes. Retropharyngeal abscess may complicate influenza, and is ushered in by fever. The head is held on one side and kept rigid. Liquids are regurgitated and choking attacks are common. Diagnosis is usually possible with digital exploration. Unskilful treatment may lead to aspiration of escaping pus. The left index finger should be used as a guide for the knife, which must be properly protected save for the point. The instant the knife is withdrawn, the nurse bends the infant forward to prevent aspiration of pus.

Ozæna.—Murray and Larson[8] have carried out original investigations by injecting twenty-seven rabbits with cultures of Perez's organism, but have not been able to obtain any experimental evidence that the bacillus described by Perez is the cause of ozæna, and they do not believe that the clinical evidence is sufficient to warrant the belief that that bacillus is the true cause, as equally good results have been obtained by investigators who have used other forms of vaccine.

McKenzie, Mackeith and Wingrave[9] bring forward some evidence to show that ozæna is really a form of tuberculosis. McKenzie summarizes the first portion of the inquiry as follows: (1) In the majority (68 per cent) of post-mortem examinations upon ozænatous patients, pulmonary tuberculosis was found to be present. (2) Clinical examination of ozænatous patients revealed manifest personal tuberculosis in from 20 to 58 per cent of the cases. (3) The family history

of ozænatous patients showed the existence of family tuberculosis in from 46 to 90 per cent. (4) The von Pirquet reaction was positive in 80 per cent of the cases under fifteen years of age. (5) The tuberculin (hypodermic) test was positive in 94 per cent of the cases tested. (6) There is some evidence tending to show that ozæna is commoner in patients with phthisis pulmonalis than in the general community. (7) There is evidence tending to show that the acid-fast bacillus of the ozænatous crusts is an attenuated variety of the tubercle bacillus. (8) Ozæna resembles in many of its details other 'paratuberculous' diseases.

Tuberculin treatment was carried out by Mackeith. The results in the 13 cases treated were as follows: Great improvement in 7, improvement in 3, improvement followed by relapse in 2, treatment of no avail in 1. By 'improvement' is meant disappearance of fœtor and crust-formation, and reduction in the amount of discharge. Several patients volunteered the information that their sense of smell had returned or was very much improved. The cases, however, show a tendency to relapse after treatment is stopped, and the method is extremely tedious.

Malignant Disease.—StClair Thomson[10] remarks that with the birth of rhinology, cases of cancer of the nose came under observation at an earlier period. For malignant tumours originating in the ethmoidal region and the antronasal wall, as well as for those starting in the roof of the nose, he particularly recommends **Lateral Rhinotomy** or Moure's operation. The interior of the nose is prepared half an hour to one hour before operation by coating the mucous surface with small pieces of one-inch ribbon gauze, saturated with equal parts of adrenalin and 5 per cent solution of cocaine. When the patient has been placed under chloroform, two tethered sponges are introduced into the post-nasal space. A clip is passed through the tongue, which is drawn forward, so as to allow of the administration of chloroform through the mouth. Two incisions are started on the affected side, much the same as those for removal of the upper jaw, except that the descending one is not carried into the lip, but stops at the true margin of the nostril (*Fig.* 93). These incisions are carried down to the bone and, with suitable periosteum detachers and raspatories, a triangular flap of skin and soft tissues is turned downwards and outwards (*Fig.* 94). The pyriform opening of the nose should be defined, as well as the margin of the orbit, and the junction of the superior maxilla with the frontal and nasal bones.

Fig. 93.—Moure's operation. Skin incision.

With chisel and hammer the bone is now divided along three lines. The first divides the nasal bone from its fellow; the second follows the line of junction of the frontal bone with the nasal and maxillary; and the third passes from the lower and outer corner of the pyriform opening upwards and outwards into the orbit. In this last cut it is well to try and avoid the infra-orbital nerve if possible. The piece of bone included in these lines is now seized with lion forceps and twisted out. Immediately below it we come on the ethmoid region, the antronasal partition, and the upper part of the maxillary sinus (*Fig.* 95).

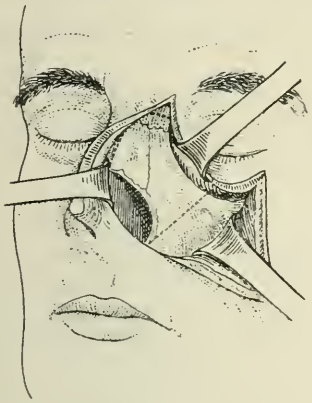

Fig. 94.—Moure's operation. Skin flaps have been retracted, and the dotted lines show where the bones should be chiselled through.

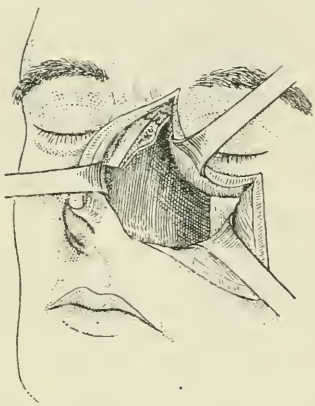

Fig. 95.—Moure's operation. Exposure of the nasal and maxillary cavities through the side of the nose.

The lachrymal canal should be defined and carefully retracted. On plucking away the ethmoid with Luc's forceps, we are able to see into the maxillary sinus from above. The front wall of the sphenoidal sinus is now hardly one inch distant from the surface. The growth is attacked with Luc's forceps, conchotomes, sharp spoons, or ring knives, and can readily be followed back into the nasopharynx and sphenoid, outwards into the orbit, and downwards right on to the floor of the nose and the maxillary sinus. Thomson has not found the hæmorrhage alarming if the growth is attacked boldly and cleared away quickly. When the bleeding is arrested and the post-nasal plugs are taken out, the skin incisions are brought together carefully with silkworm-gut or horsehair sutures. Dressings on the face are not required. It is also well to dispense with any dressing or plugging inside the nose. The patient should avoid blowing the nose, and must be instructed to suck the discharge backwards. The scar within a few months is so slight as to be almost invisible, and there is no disfigurement and no interference with the muscles of the face. A few patients report epiphora in windy weather, and some draw attention to the formication or numbness of the upper lip and cheek

on the affected side. Internally there is a free thoroughfare and no crusting. The enlarged nasal cavity presents a perfectly healthy appearance, and it is now easy to keep a watchful eye for any signs of recurrence.

The orbit can be cleared out through the same incision, preserving the lower eyelid while, if necessary, sacrificing the eye. The nasal septum can be removed if the growth has attacked it. If the floor of the nose is found to be invaded, the addition of a Rouge's operation can be made. In all cases there is no disfigurement, while patients are left with an intact roof to the mouth and require no troublesome obturator.

Kaempfer reports favourably of the hæmostatic action of **Coagulen** in nasopharyngeal operations. p. 14.

References.—[1]*Jour. Laryngol. Rhinol. and Otol.* 1916, July; [2]*Ibid.* April: [3]*Ibid.* Jan.; [4]*Brit. Med. Jour.* 1916. i. 541: [5]*Laryngoscope*, 1915, Sept.: [6]*Boston Med. and Surg. Jour.* 1915, ii. 702; [7]*Med. Rec.* 1916, i. 840; [8]*Laryngoscope*, 1915, 763; [9]*Jour. Laryngol. Rhinol. and Otol.* 1916, May, June, July; [10]*Lancet.* 1916, i, 987.

OBESITY. *Herbert French, M.D., F.R.C.P.*

The Gutman[1] treatment of obesity is almost entirely dietetic, and it appears to be eminently successful in that it accomplishes weight reduction steadily without causing the patient great sense of deprivation or starvation. He receives bulk without too much substance. A diet specially prescribed is always of more value, more scientific, better adapted to, and more appreciated by, the patient. On the other hand, in order to save time, it is advisable to have on hand a skeleton diet so composed as to meet all general requirements of a successful obesity cure. Table I exhibits what Gutman has used for a number of years with very good results. Although modifications of this schematic diet were made in a great many cases, the fundamental basis was retained. The skeleton diet contains about 1100 calories, of which over 400 are in the form of proteins, 540 in carbohydrates, and only 156 in fats. The amounts of proteins and carbohydrates suffice for the prevention of unnecessary tissue waste, while the quantity of fat constitutes a minimum. The proteins found in the dietary are of various kinds—animal, vegetable, etc.—producing upon decomposition various forms of amino-acids, a fact of importance in the reconstruction of every body-cell. There is also sufficient bulk of food at every meal—enough to satisfy even a good appetite. The quantity of food contained in the diet is also sufficient to meet the demand of the ordinary processes of metabolism. This diet, with a certain amount of modification, has caused a loss of weight in every case, with but few exceptions: in some, even as much as twenty and twenty-two pounds were lost during the first month of treatment.

Modifications of the diet can easily be accomplished by the substitution of some articles of food by others. This may be facilitated by the use of some such table as the one hereto appended, Table II, exhibiting the calorific value of foods. Thus, personal predilection for

particular foods, the habits and social usages of the patient, as well as changes of the dietary to avoid monotony, can be easily and simply accomplished. It is best also to adhere to the use of simple foods and to avoid table luxuries. The latter are often stimulating to the palate, favouring an extraordinary intake of food and an increase in the obesity. They are also difficult to compute as to their energy value, which makes their administration in exact quantities difficult.

TABLE I.—*Skeleton of Reduction Diet (Gutman).*

Quantity in grms.	Food	Proteins	Fats	Carbohydrates	Calories
	Breakfast:				
100	Baked apple	0·3	—	12·8	53
50	Egg	6·0	5·7	0·4	84
50	Roll	3·5	0·2	28·2	132
200	Tea, lemon	—	—	—	—
5	Sugar	—	—	4·8	19
	Luncheon:				
100	Lamb chop or cold chicken	19·0	0·8	—	100
100	Salad	1·1	0·2	1·8	15
40	Rye bread	1·9	0·2	20·0	88
200	Buttermilk	7·2	1·8	7·6	84
	Dinner:				
200	Consommé	1·2	1·2	—	16
200	Beef steak	40·0	5·4	—	242
100	Potato	1·5	0·1	20·0	88
200	Fresh vegetables	2·2	0·4	3·6	30
150	Fruit dessert	0·5	—	18	75
200	Coffee	—	—	—	—
40	Rye bread	1·9	0·2	20·0	88
	Total	86·6	16·2	137·2	1114
	Calories	418	156	540	1114

TABLE II.—*Calorific Value of 100 Grms. of Common Foodstuffs.*

Foods	Calories average	Foods	Calories average
Lean beef	100	Butter	750
Lean Chicken ..	110	Cheese	450
Lean Lamb ..	100	Eggs	150
Fish ..	70–90	Bread	250
Lobster	90	Flour	350
Oyster	60	Sugar	400
Milk	60	Potatoes	90
Buttermilk	45	Vegetables ..	20–40
Skimmed Milk ..	45	Fruits	50

REFERENCE.—[1] *N. Y. Med. Jour.* 1916, i, 163.

ŒSOPHAGUS, DISEASES OF.

J. S. Fraser, M.B., F.R.C.S.

Carcinoma.—Torek[1] remarks that the treatment of carcinoma of the œsophagus is still very unsatisfactory. Patients consult their physicians only when they are unable to swallow solid food—a late symptom. Pain is also a late symptom, and usually signifies that the disease has extended beyond the limits of the œsophagus. The earlier symptom—temporary disturbance of deglutition, due to inflammatory swelling in the vicinity of the small carcinoma—does not receive serious attention on the part of the patient. Diagnosis is chiefly made by *x* rays and œsophagoscopy.

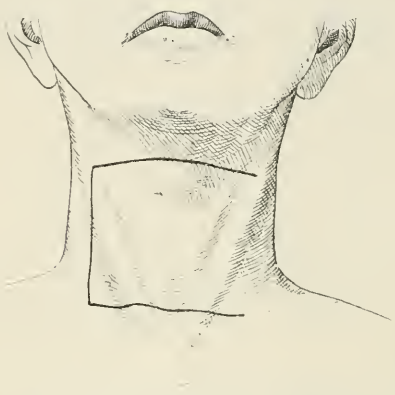

Fig. 96.—Outline of flap for the construction of a new œsophagus (Ach's method).

The cervical portion of the œsophagus has been resected a number of times with a successful issue. The resection of the abdominal portion has been attended with success three times—Völcker in 1907, Kümmel in 1909, and Zaaijer in 1913. Of these, two were cases of carcinoma of the cardiac end of the stomach. Völcker and Kümmel, operating entirely from the abdomen, describe the great difficulty they experienced in bringing the œsophagus down far enough to suture it to the stomach. In case of an involvement of the œsophagus itself, this difficulty would be much increased. Zaaijer operated by a combined abdomino-thoracic method. Torek claims that he alone has operated successfully on carcinoma of the thoracic œsophagus.

Resection of the Cervical Portion.—A preliminary gastrostomy should be done to improve the patient's nutrition and protect him against some of the dangers of wound infection. The tumour must be removed by a circular resection of the œsophagus at least 2 cm. distant from each end of the carcinoma. Affected or suspected glands should be removed at the time or later. In advanced cases it may be necessary also to remove the larynx and part of the trachea. As a rule, an attempt should be made to restore the œsophagus by making a broad skin flap from the neck (*Fig.* 96) and turning it upon itself so as to form a tube (*Fig.* 97) with the skin side inward. The two

Fig. 97.—Flap shown in *Fig.* 96 rolled up to form a tube—the skin surface inside. One side remains open, and is closed subsequently.

ends of this tube are sutured to the upper and lower ends of the œsophagus. The open side is closed two weeks later, and the raw surface covered by a skin plastic. Another method is von Hacker's. The skin flap is placed into the depth of the wound to form the posterior wall of the œsophagus. In the second stage a skin flap is shaped, and the two ends are turned toward each other and united to form a tube. The tube is covered by lateral skin flaps mobilized for the purpose. The mortality of cervical œsophagectomy is about 36 per cent.

Resection of the Thoracic Portion.—Efforts at extrapleural resection are still being continued, but the transpleural route of access to the œsophagus is generally preferred. Torek adopts the latter, and, as regards anæsthesia, advises intratracheal insufflation rather than the use of two different chambers for the head and body of the patient.

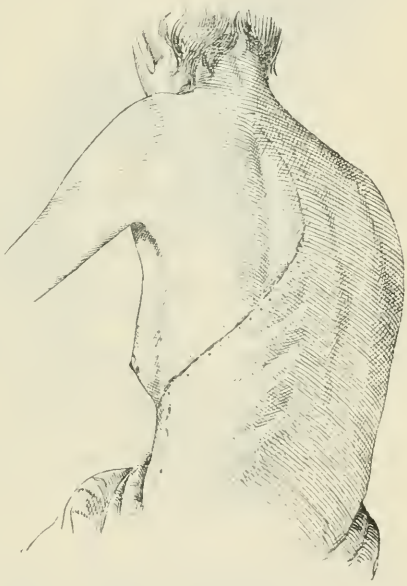

Fig. 98.—Torek's operation. The skin incision.

Cardiac insufficiency, anæmia, and catarrhal affections of the lungs require careful pre-operative treatment. A preliminary gastrostomy must be performed. Contra-indications are metastases, extension of the disease beyond the gullet, nephritis, myocarditis, chronic alcoholism, cirrhosis of the liver, also failure to gain weight after the preliminary gastrostomy.

Torek's operation is carried out in two stages. In the first, gastrostomy is performed, and the abdominal cavity is carefully examined for metastases. In the second stage the œsophagus is resected. The patient lies on his right side, with his left arm up and well forward, so that the scapula is out of the line of incision. A cushion is placed under the right side of the chest. An incision corresponding to the entire length of the seventh intercostal space is made through skin and muscles down to the pleura. Hæmorrhage from the external wound is attended to before the pleura is opened. From the posterior end of this incision the knife is carried upward to the third intercostal space (*Fig.* 98). Skin and muscles are divided, exposing the fourth, fifth, sixth and seventh ribs. The wound is now isolated by fastening towels to the edges of the incision with skin-clasps. Complete hæmostasis must be obtained. For this first step of the operation Torek prefers local anæsthesia. While the vessels

are being ligated, general anæsthesia is induced, and as soon as the patient is under the influence of the anæsthetic, the larynx is intubated for intratracheal insufflation anæsthesia. The pleura may then be opened without fear of dangerous collapse of the lung. A moderate degree only of intrapulmonary pressure should be employed, so that the lung may collapse to some extent and escape injury. The incision of the pleura extends through the entire length of the seventh intercostal space, and an examination is made to determine the operability of the tumour.

If we decide to proceed, we now divide the seventh, sixth, fifth, and fourth ribs between their angles and tubercles, and the intercostal muscles, with the intercostal vessels and nerves. A rib spreader is placed between the seventh and eighth ribs. In this way a thorough view of the whole of the left pleural cavity is obtained. Torek next proceeds to free the lung thoroughly of all adhesions, with the utmost care to prevent tearing or cutting the lung, which is then laid over toward the front part of the mediastinum and kept only partially inflated. (If the opposite pleura is opened in the course of operation, a more energetic inflation is required, for we cannot allow both lungs to collapse. Lung retractors are then needed.) The œsophagus is now seen as a slight bulging of the parietal pleura to the side of the aorta. The pleura is divided at some portion where it is not involved, and the œsophagus lifted out of its bed. A tape is drawn through underneath it to serve as a handle on which to draw (*Fig.* 99). The œsophagus is then liberated from the surrounding structures up to the upper thoracic aperture and down to the diaphragm. The dissection is best done with Kocher's goitre sound or Mayo's dissecting scissors. The liberation of the vagi from the œsophagus is accomplished by keeping close to the œsophagus and leaving the nerves in their places. The less the vagi are handled the better. Sudden and irreparable collapse has resulted from pinching them or tugging at them. In releasing the posterior surface of the œsophagus the surgeon must remember that the right pleura is tucked in behind

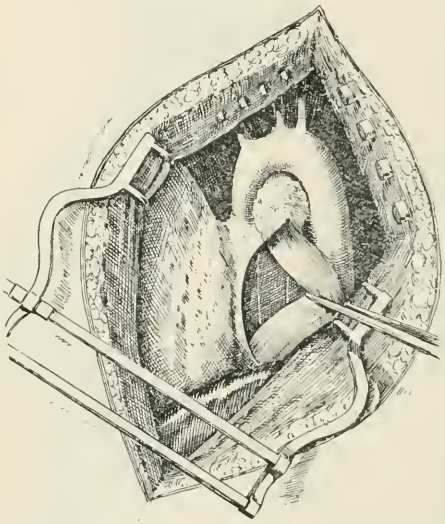

Fig. 99.—Dissection of the œsophagus. After incising the pleura the œsophagus is lifted out of its bed and held by a tape passing underneath it. The two vagi have been detached. The tumour is seen below the arch of the aorta. The lung is fairly well collapsed.

the œsophagus to some extent. Dissection of that part of the œsophagus which is crossed by the arch of the aorta is not easy. It is carried out by blunt dissection with the finger. One must be careful not to tug hard on the aorta, as the right heart is already working at a disadvantage. Above the arch the œsophagus is liberated in the same way as below. When the upper thoracic aperture is reached, a finger is carried through it into the neck to the anterior border of the sternomastoid muscle. Here an incision is made through which the œsophagus is afterwards to be brought out. For the time being, a stout silk thread is carried into the pleural cavity through this wound, to serve for pulling out the œsophagus.

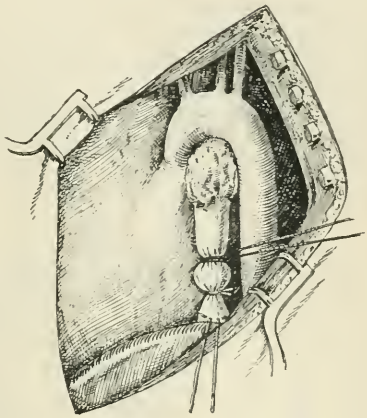

Fig. 100.—The œsophagus is doubly ligated before being cut. About 2 cm. below the lower ligation a purse-string suture is laid for subsequent invagination of the lower stump.

Before dividing the gullet the surrounding parts are well protected by gauze pads. The œsophagus is tied off with a silk ligature at a safe distance below the tumour, and a second ligature is applied a sufficient distance below the first to enable one to cut the œsophagus between them without danger of the ligatures slipping off (*Fig.* 100). The site of the lower ligation is thoroughly crushed with Payr's duodenum clamp, in order to facilitate the subsequent invagination of the stump. Before dividing the œsophagus, a purse-string silk suture is inserted 1 or 2 cm. below the lower ligation. If the carcinoma is very low down, the stomach must be brought up into the thoracic cavity to afford the necessary space for putting in the sutures. The œsophagus is now divided between the two ligatures, and the

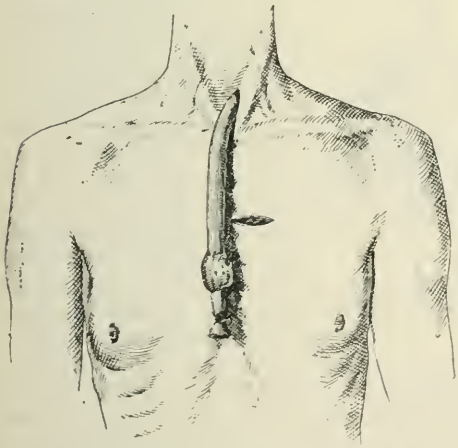

Fig. 101.—The œsophagus brought out through an incision in the neck. On the chest is a transverse incision over the site where the œsophagus is to be amputated. Between these two incisions the skin is subsequently tunnelled to receive the œsophagus.

mucosa of the upper stump cauterized with a Paquelin cautery or with carbolic acid. The lower stump is invaginated and secured by the purse-string suture; if possible, a second purse-string suture is placed to invaginate the stump still further. The upper stump is pushed through the channel beneath the arch of the aorta, and the ligature at its end is tied to the silk thread which had been introduced into the pleura through the neck incision. The œsophagus, with the tumour attached, is now drawn out through the neck wound (*Fig.* 101). Torek next proceeds to close the chest. Sutures of strong silk are carried around the seventh and eighth ribs. No attempt is made to reunite the ends of the cut ribs: they fall in proper alinement of themselves. The muscles are united in layers by catgut sutures. Before making the suture air-tight, the lung is thoroughly inflated, to bring its surface in contact with the parietal pleura. A small amount of air left in the pleural cavity is entirely harmless. The suture of the skin completes the closure of the thoracic wound. We now again turn our attention to the œsophagus. Holding it down over the front of the chest, we estimate where it is to be amputated, and make a transverse incision through the skin at this point (*Fig.* 101). The skin between the neck wound and the new incision on the chest is then undermined, and the œsophagus, still unopened, with the tumour attached, is drawn through this tunnel and out through the new wound. The incision in the neck is closed, the tumour amputated, and the free end of the œsophagus is sutured to the skin by a few interrupted stitches.

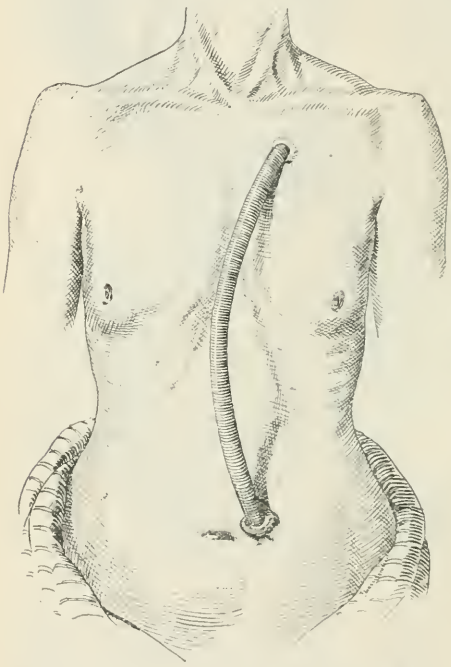

Fig. 102.—Showing the tube connecting the lower end of the œsophagus with the gastrostomy opening.

After operation the patient lies partly on the right side and partly on the back. Morphine is given for a few days, and stimulants—camphor, caffeine, and strophanthus. Nourishment is taken through the gastrostomy tube. After the free end of the œsophagus has thoroughly healed to the skin, the upper end of the gastrostomy tube

is inserted into it, when the patient requires nourishment. The swallowed food passes from the œsophagus into the rubber tube, and thence into the stomach (*Fig.* 102).

Torek has operated on three cases according to this method. (1) The first patient was operated on twenty months ago, and is now able to eat practically all kinds of food. (2) The second case was a woman who, in spite of her gastrostomy feeding, continued to lose weight. She died suddenly, five days after the operation, from cardiac failure. (3) The last case was an alcoholic male with cirrhosis of the liver, nephritis, and myocarditis, who died in the course of the night following the operation.

An argument in favour of operating on the right side is that here the aorta is not in the way and the œsophagus stands out more prominently. The only obstacle is the vena azygos, and that may be divided. In the lower portion, however, the liver forms a serious hindrance. Another objection lies in the fact that the right lung is the larger of the two. If there were definite proof that the operation would be limited to the upper two-thirds of the œsophagus, the right side might be chosen.

See also *X*-ray diagnosis, p. 37.

REFERENCE.—[1]*Ann. Surg.* 1915, i, 385.

OTITIS MEDIA. (*See* EAR, DISEASES OF.)

OVARIAN GRAFTING. *W. E. Fothergill, M.D.*

S. A. Chalfant[1] reports on thirty-two cases of subcutaneous transplantation of ovarian tissue by Simpson and himself. This small series of cases when analyzed tends to show that : (1) In the majority of cases the graft persists for a time ; (2) In some patients it appears to functionate, as shown by variations in size, by tenderness, and by menstruation ; (3) The patients seem to have less than the usual discomfort from the premature menopause. The writer also gives a review of the literature, from which he concludes that : (1) Transplantation from one animal to another of the same species is only rarely successful ; (2) Autoplastic transplantation delays the menopause ; (3) Even in autoplastic grafts, degeneration is common after a longer or a shorter interval.

F. H. Martin[2] also reviews the literature. This communication cannot be abstracted, dealing as it does with 134 papers, but the writer's conclusions are interesting. He says that careful sifting of the accumulated literature leaves a feeling of disappointment as to its surgical value in the mind of an impartial observer. Transplantation of ovarian tissue from its normal position to another part of the patient's own body retards and modifies the symptoms of the artificial menopause in a certain number of cases. The percentage of successful results seems to be as large when the simplest technique is employed, using small pieces of ovaries tucked into pockets of well-vascularized tissue, as when a more complicated technique is

used. The fact that homotransplants and heterotransplants are failures, made with the same technique that is employed for autotransplants, demonstrates that there is a definite antagonism between the tissues of different individuals of the same species, and a prohibitive antagonism between the tissues of different species. The writer quotes Hartmann's study of the work of Tuffier. Hartmann says that, judging by Tuffier's results, the operation of transplantation should be abandoned, and he considers that if ovarian tissue cannot be left in a patient in its normal position, it is not worth while to leave it at all.

Tuffier's position in 1915 may be expressed in his own words as follows: "All recent cases of salpingitis and all malignant diseases contra-indicate the procedure. After the fortieth year it is unnecessary. Another local contra-indication exists in cases where strong adhesions are present between the ovaries and the pelvis. In these cases, if the uterus is not removed the patient always complains of pain in the lower abdominal region. . . . . Ovulation without menstruation is altogether useless. . . . . Where the uterus is absent, ovarian transplantation is of no value. With these exceptions I can say that I am sure that my operation is a good one. Menstruation in young and very nervous women must be preserved." [All of which suggests that a number of people have wasted much time and trouble on the subject of ovarian grafting. The gynæcologist, whose main work is to cure the patient and not merely the disease, will do well to act as follows: (1) If forced to remove the uterus, remove both ovaries also; (2) If forced to remove both ovaries, remove the uterus also. In other words, if you cannot leave a healthy uterus and one healthy ovary, leave nothing.—W. E. F.]

References. [1]*Surg. Gyn. and Obst.* 1915, ii, 879; [2]*Ibid.* 568.

OZÆNA. (*See* Nose, Diseases of.)

PANCREAS STONE COLIC. *Robert Hutchison, M.D., F.R.C.P.*

Einhorn[1] describes two cases of this rare condition and reviews the literature relating to it. As regards diagnosis, colicky pains, occurring periodically in the epigastrium and associated with a transient glycosuria, are probably caused by a pancreatic stone. A calculus in the fæces composed mainly of salts of lime without cholesterin or bile pigment, points to a pancreatic origin.

Treatment.—As in all other diseases, an early diagnosis offers the best opportunity for successful treatment. Just as in gall-stone colic, **Rest** during and immediately after the attack is of most importance. The patient is kept in bed, placed upon a light diet, warm applications are made to the abdomen, and, if the pains are severe, **Opium** or **Atropine,** or both, may be given.

Shortly after the attack, frequent small meals and the drinking of alkaline waters are indicated. If these measures should not be successful, and the attacks become more frequent, or if they become more

severe and are attended with a slight rise of temperature, an **Operation** should be advised in order to examine thoroughly the gall-bladder and pancreas. If a stone is found, it ought to be removed. If this is not the case—frequently with small stones it is impossible even with the pancreas directly under our fingers to feel them—drainage of the gall-bladder should be done. This must also be done when stones have been found and removed, as one cannot be sure that small stones have not remained hidden. The drainage of the gall-bladder exerts a beneficial effect upon an existing pancreatitis, which we generally find associated with the calculi. Through free drainage the liver and pancreas are eased, and the latter organ returns to normal activity.

Reference.—[1]*Med. Rec.* 1915, ii, 681.

PANCREAS, SURGERY OF.

E. Wyllys Andrews, M.D., F.A.C.S. (Chicago).

Serafine[1] reports a case of resection of a tumour of the pancreas, with recovery. This is the fifth in the literature. Two—W. J. Mayo's and Finney's—were benign cystadenomas, Lussini's a hypernephroma, and Korte's a carcinoma. The author's case made a good post-operative recovery. There was a severe transient glycosuria, and large amounts of fatty acids, neutral fats, and soaps were found in the stools. Microscopically, the tumour, after very careful study, was called a scirrhus adenocarcinoma with almost certain origin in the acini. The author remarks on the lack of destruction of the islands of Langerhans by the tumour, in areas where the remaining tissue was atrophied or degenerated.

Deaver[2] traces the origin of pancreatitis to the lymphatics, and suggests that the co-existence of cholecystitis may be due to the fact of the two diseases having a common origin rather than one causing the other. He also states that in many cases of pancreatitis there is no gall-tract disease. Rosenow's work has brought to mind the possibility of hematogenous infection by streptococci which have acquired a specific affinity for pancreatic tissue.

Einhorn urges the more careful analysis of cases of pain in the epigastrium with a view to diagnosis of pancreatic stone. Colic-like pains, with transient glycosuria recurring at intervals and stopping suddenly with the passing of the stones, are almost diagnostic. If the stone can be found in the stools, it is composed of calcium carbonate, and contains no cholesterin or bile salts.

In a detailed study of a fatal case of acute hæmorrhagic pancreatitis, Kenney found no evidence of the cause of the hæmorrhages, or that the condition of the gland was due to anything but them. He urges routine exploration of the pancreas in all laparotomies, especially in gall-tract diseases.

References.—[1]*Policlinico*, 1915, xxii, c, 551; [2]*Penn. Jour. Med.* 1915, xix, 179. Other references are: *Berl. klin. Woch.* 1916, liii, 110; *Jour. Exper. Med.* 1916, xxiii, 491; *Rev. Assoc. Med. Argent.* 1916, xxv, 542.

PARALYSIS, CEREBRAL. (*See* CEREBRAL PARALYSIS.)

PARALYSIS, INFANTILE. (*See* POLIOMYELITIS, ACUTE ANTERIOR.)

PARALYSIS, ULNAR. *J. Ramsay Hunt, M.D.*

J. Ramsay Hunt[1] describes a curious form of *chronic progressive neuritis* of the ulnar nerve which develops many years after fractures and dislocations about the elbow-joint. Usually the injury to the joint has been received in childhood, the first symptoms of ulnar neuritis making their appearance in adult life. An interval which varies from six to thirty-five years may elapse between the initial injury and the first symptoms of ulnar neuritis, which are then gradually progressive. This remarkably long latent period excludes the group of cases, not uncommon, in which secondary paralysis follows redundant callus formation, vicious union, or other mechanical complications of fracture which jeopardize the integrity of neighbouring nerve structures. The curious, and at the same time characteristic, feature of the late paralysis, is its appearance so long after the original injury that a direct connection between the two conditions might be open to question, and a natural scepticism as to the etiological relationship may lead to diagnostic doubts and errors. This is especially true on account of the gradual and progressive atrophy of the small muscles of the hand which is the essential symptom, the sensory disturbance being very slight, or in the earlier stages even absent. Under these circumstances, the possibility of progressive muscular atrophy may be seriously considered, and lead to diagnostic error.

The late neuritis of the ulnar nerve does not differ in symptomatology from other forms of progressive neuritis. Usually there is an atrophic paralysis of gradual development, with changes in the electrical excitability corresponding to the degree and duration of the muscle degeneration. The sensory symptoms, both subjective and objective, may be very slight, and when present are typically neural in distribution. Even in advanced cases the anæsthesia is of the epicritic type, the protopathic sensibility being well preserved. In the absence of pain, this scarcely perceptible disturbance of tactile sensibility may be overlooked and lead to the suspicion of progressive muscular atrophy, more especially as the wasting of the small muscles of the hand is slowly progressive.

DIAGNOSIS.—In the diagnostic differentiation the hypothenar type of neural hand atrophy described by Hunt may be noted, which is caused by chronic pressure neuritis of the deep palmar branch of the ulnar nerve. This branch of the nerve is purely motor, and the resulting atrophy is strictly limited to the small muscles of the hand supplied by the ulnar nerve. In this type, as in the tardy paralysis, the course may be slowly progressive; and with the absence of all sensory symptoms, both subjective and objective, a clinical picture is produced which may closely resemble an early stage of progressive muscular atrophy.

The essential etiological factor in these cases of late paralysis is the deformity and malposition of the elbow-joint, usually the result of fracture-dislocations in early life. The most frequent deformity is cubitus valgus, which in many cases is associated with evidences of old fracture of the external condyle of the humerus. Usually the nerve is perfectly free and movable in its shallow or partially obliterated bony groove, and is the seat of a fusiform swelling. This spindle-shaped tumefaction of the nerve is from two to three inches long, its central portion corresponding in a general way to the tip of the olecranon.

The peculiar and unusual feature of this group of cases is the long interval of time elapsing between the original injury and the development of the first symptoms of ulnar neuritis. This may range all the way from six to thirty-five years.

The diagnosis rests on the presence of an old joint lesion and the neuritic character of the symptoms. In differential diagnosis the progressive spinal atrophies and the hypothenar type of neural atrophy (compression neuritis of the deep palmar branch of the ulnar) will demand consideration.

Treatment.—Surgical measures are usually indicated to check the progress of the atrophy and restore function. Among the procedures advocated in the different types of cases are: enlargement and remodelling of the ulnar groove; resection of thickened portion of the nerve trunk; transposition of the ulnar nerve to the anterior surface of the internal condyle, and supracondyloid cuneiform osteotomy of the humerus to correct the valgus deformity.

The author describes three cases of this late form of palsy.

Reference.—[1]*Jour. Amer. Med. Assoc.* 1916, i, 11.

PARALYSIS AGITANS. *J. Ramsay Hunt, M.D.*

In a chronic progressive affection like paralysis agitans any method which causes recession or amelioration of symptoms would be a most valuable adjunct to treatment. Many remedies have been suggested from time to time, which even in the hands of the most optimistic have failed to achieve any lasting or encouraging results. Such a remedy is the **Parathyroid Gland,** which was suggested some years ago by Lundborg and Berkeley, on the hypothesis that the motor disturbances after parathyroidectomy resembled those of paralysis agitans. This remedy has been given a fair trial by many observers, with contradictory, but usually unsatisfactory, results.

Berkeley[1] again repeats his contention that the parathyroid treatment is of benefit in this disease. He states that it is not a 'cure' for paralysis agitans, but that 60 to 70 per cent of the sufferers from this dreadful disease who have given the remedy a fair trial for from three to six months (it takes all this time to test it) have been greatly benefited, and that in such patients the progress of the disease has been arrested, or very materially retarded. The best preparation is an acetic extract of the fresh glands (commonly called, though very

inaccurately, a 'nucleoproteid' extract), made by treating the ground or triturated glands with cold distilled water, filtering, and then precipitating with a very minute amount of acetic acid. This extract is given in doses of $\frac{1}{50}$ gr. (either in capsule with milk sugar, or as a hypodermic solution). It is absolutely without local effects of a disagreeable nature.

REFERENCE.—[1]*Med. Rec.* 1916, ii, 105.

PARAPSORIASIS. (*See* MYCOSIS FUNGOIDES: PITYRIASIS LICHENOIDES CHRONICA.)

PARATYPHOID FEVERS. (*See also* TYPHOID FEVER.)

E. W. Goodall, M.D.

In the last number of the ANNUAL (p. 615) attention was drawn to the fact that these fevers, together with typhoid, had made their appearance amongst the French and British troops on the Western front soon after the beginning of the war. Unfortunately, too, they appeared in other regions where the allied troops were engaged, notably in Gallipoli. Consequently ample opportunity has been given for their study, and during the past year a considerable number of papers on the subject have been published. The facts in this article have been obtained very largely from a perusal of the authors whose names follow, as well as from the writer's personal experience in a French hospital in the spring of 1915: Robinson,[1] Dawson,[2] Leishman,[3] Bassett Smith,[4] Castellani,[5] Robinson,[6] Tidy,[7] Miller,[8] Kenny,[9] Stolkind,[10] Marcel Labbé,[11] Torrens and Whittington,[12] Ledingham and Penfold,[13] Salford,[14] Lévy-Valensi,[15] Wiltshire,[16] Dawson and Whittington,[17] Carles and Marchand,[18] Chantemesse and Grimberg,[19] Cade and Vaucher,[20] and Moorhead.[21] Paratyphoid fever was first distinguished from typhoid in 1896, by Achard, of Paris. Since that year it has been further differentiated into two groups, A and B. The three diseases, typhoid and the two paratyphoids, are now classed together as the 'enteric' group. Hitherto paratyphoid A has been very rare in Europe, but has been met with in India and the East. Paratyphoid B is the form which occurs in Europe, though it is nothing like so common as typhoid, the fever due to the Eberth-Gaffky bacillus. According to Dawson, the appearance of paratyphoid A in France was due to 'carriers.' He states that the majority of cases were in soldiers who had either come from India or had been in contact with those who had. Leishman, however, says that while the earlier cases of paratyphoid A occurred amongst the British troops who had come from India, it was soon found that the cases were not limited to those troops or to those in contact with them; and he thinks it probable that other cases had either been contracted from the civil population or had been brought from other countries or from home. But he agrees that the infection was conveyed chiefly by carriers.

Several of the papers to which we have referred enter into detailed

descriptions of the clinical aspects of paratyphoid. We do not propose, however, to give them here, for the reason that with a consent that is almost unanimous the authors state that not only is it quite impossible to distinguish clinically paratyphoid A from B, but, further, that in all but a very small minority of cases the paratyphoids cannot be distinguished from typhoid. In all these diseases the ultimate diagnosis rests with the bacteriologist. Doubtless, if one has to deal with a series of cases, as in an epidemic, a shrewd guess can be made: but in respect of individual cases, clinically the diagnosis can be only 'enteric.' There are, however, two signs which appear to be fairly characteristic when present. The one is the size of the spots which constitute the eruption, the other is the pulse-rate. When the spots differ from those commonly found in typhoid they are a good deal larger, palpable, of a slightly darker hue, and do not disappear completely on pressure. The spots, too, whether of this nature or of the ordinary typhoid variety, are prone to appear for the first time late in the disease, even after the temperature has regained the normal. They are described as being occasionally so numerous as to coalesce and give rise to a measly erythema. In regard to the pulse-rate, it has been observed to be remarkably infrequent in many cases, so that even when the temperature is considerably raised, the pulse-rate may be 70, 60, 50, or even so low as 44 per minute.

In all other respects the clinical manifestations of paratyphoid are those of typhoid fever of a mild form as it is already known. The length of the incubation period is the same; the mode of onset is the same; the curve on the temperature chart is much the same, though two or three writers incline to the view that it is more 'spiky,' that is, more up and down, than that of typhoid. Taking the cases in bulk, an attack of paratyphoid is less severe and of shorter duration than that of typhoid; and the constitutional symptoms exhibit a milder character. The spleen may or may not be enlarged; mostly it is not; at any rate the enlargement is not ascertainable during life. There is a slight disagreement amongst writers as to the comparative severity of paratyphoid A and B. On the whole it would seem that A is the more severe of the two. So also with the fatality; it is agreed by all (with one exception) that the fatality of either of the paratyphoids does not exceed 4 per cent, and may be as low as 1 per cent in a large series of cases. The exception is Labbé, who met with 5 deaths in 45 cases (11 per cent fatality), as against a fatality of 15 per cent amongst typhoid cases occurring during the same period. This observer is also of the opinion that respiratory symptoms and complications are unusually frequent in the paratyphoid cases.

Complications are not so common as in typhoid. Such as occur are mostly of a suppurative nature. Intestinal perforation and hæmorrhage are infrequent. Relapses, however, are fairly common.

Various forms of the disease have been described, based almost entirely upon the character of the febrile attack as shown by the

temperature chart; but the distinctions are artificial, and much the same as have been made in typhoid. Stolkind, of Moscow, however, gives quite a different classification, viz.: (1) The influenzal form, or respiratory paratyphoid; (2) The gastro-intestinal form; (3) The choleraic form; (4) The typhoid form. He states that there are transitional cases between these forms, and that besides these four principal forms there are cases of paratyphoid infection of separate organs (appendix cæci, cerebral meninges, gall-bladder, etc.). Drought and Kennedy[22] have published an account of a case in which cystitis, and probable also pyelitis, were due to infection with *B. paratyphosus B*, without there being the usual symptoms of paratyphoid fever; and Frugoni and Cannata[23] have recorded a small epidemic of jaundice due to *B. paratyphosus B*.

Morbid Anatomy.—Usually intestinal ulceration is found, indistinguishable from that of typhoid. There may, however, even in cases which clinically are of the usual type, be few or even no intestinal lesions. Dawson and Whittington's experience goes to show that while the lower two feet of the small bowel are usually the seat of ulceration, the large bowel is more frequently affected —especially in paratyphoid B—than in typhoid. Stolkind, from an analysis of 100 autopsies, concludes that the intestinal lesions are very variable; in some cases the lesions are like those of typhoid, in others of dysentery, in others, again, of acute enteritis and of septicæmia. But in regard to this point it has to be borne in mind that mixed infections may occur, not only of the three enteric diseases, but of these with dysentery, etc. (Kenny, Chantemesse and Grimberg. Ledingham and Penfold).

Diagnosis.—Reference has already been made to the clinical diagnosis. It remains to add a few words on the bacteriological and serum diagnosis. As with typhoid, so with paratyphoid, the earlier the case is examined during the febrile stage, the more likely is the causative bacillus to be found in the blood. Dreyer, whose experience of these methods of diagnosis is very extensive, states that, of the three diseases of the enteric group, in about 30 per cent of cases in which the microbe was actually recovered it was possible to isolate it from the blood, whether the case happened to be paratyphoid A, paratyphoid B, or typhoid. From the stools it was possible to recover it in about 20 per cent of the cases of typhoid and paratyphoid A, whereas it could be recovered from the stools in between 70 and 80 per cent of the cases of paratyphoid B. In many cases several examinations had to be made before the specific organism was isolated.

The blood serum of a case of paratyphoid A agglutinates the *B. paratyphosus A* less readily than do the sera of typhoid and paratyphoid B agglutinate their respective organisms. Dreyer concludes that for all practical purposes an agglutination of *B. paratyphosus A* by a serum diluted only 1 10 may be considered to be diagnostic of paratyphoid A infection. And even though the serum of a case of

paratyphoid B usually agglutinates the organism in high dilutions, yet, as a matter of fact, unless the patient has had paratyphoid B in the past, an agglutination with 1–10 may be taken as positive. A high agglutinative power of the serum is reached earlier in the disease in typhoid and paratyphoid B than in paratyphoid A. These results were obtained with Dreyer's own modification of the macroscopic method of observing the agglutination. Robinson, however, points out that with the same serum different results are sometimes obtained with the microscopic and Dreyer's methods, and asks which is most to be relied upon—a question which still awaits an answer.

According to Tidy, a fever of a few days' duration in a person who has been previously inoculated against typhoid, will cause the disappearance, sometimes complete, of the agglutinative property. Hence, a positive reaction with *B. typhosus* in a previously inoculated person who is the subject of fever, is of diagnostic value. But this experience is absolutely at variance with that of a considerable number of observers, and Tidy is alone in this opinion. It is generally agreed that to diagnose typhoid in an inoculated person by means of the agglutination test, the agglutinative power of the serum must be shown by a number of examinations to be progressively increasing.

Treatment.—This is the same as for typhoid, except that if the **Vaccine** treatment be adopted, the appropriate organism must be employed. Castellani states that in his hands brilliant results have not been obtained, but that the treatment is of use in protracted cases. Wiltshire says that the results are good with some samples of vaccines and not with others. The writer's own experience is that the results are very uncertain. He made use, however, of smaller doses than did Wiltshire—50 million, rising to 200 million, given on alternate days, whereas Wiltshire started with 500 million. and gave injections at intervals of three days, increasing the amounts by 500 million each time.

Prophylaxis.—Nearly all observers agree that **Inoculation** with typhoid vaccine only will not proteet against paratyphoid nor will it lessen the severity of an attack; but Labbé considers that antityphoid inoculation does mitigate the severity of an attack of paratyphoid subsequently contracted. Opinion is growing that antityphoid inoculation should now be made with a mixed vaccine of typhoid, paratyphoid A, and paratyphoid B bacilli, as recommended by Castellani and Widal, and described in last year's Annual (p. 627).

References.—[1]*Lancet*, 1915, ii, 851; [2] [10]*Proc. Roy. Soc. Med.* (Med. Sect.) 1915; [11]*Med. Press and Circ.* 1915, Nov., 434; [12]*Brit. Med. Jour.* 1915, ii, 697; [13]*Ibid.* 704; [14]*Ibid.* 713; [15]*Presse Méd.* 1915, 459; [16]*Pract.* 1916, i, 91; [17]*Quart. Jour. Med.* 1916, Jan., 98; [18]Quoted in *Policlinico*, 1916, May, 684; [19]*Presse M. d.* 1916, Jan., 265 and 273; [20]*Ibid.* July, 291; [21]*Med. Press and Circ.* 1916, ii, 94; [22]*Brit. Med. Jour.* 1916, i, 649; [23]*Lo Sperimentale* (Florence), 1916, lxx, 25 (quoted in *Lancet*, 1916, i, 800).

PEDICULOSIS. *E. Graham Little, M.D., F.R.C.P.*

The anatomy and habits of the body louse are the subject of a careful paper by Peacock.[1] The following observations are of practical interest. The female is the larger, averaging 4 mm. against the male 3 mm. The sexes are found with equal frequency. Two varieties of parasite, the black and the grey, are described, of which the grey is by far the most common. The adult form is found most often in the seams of the shirt, especially at the collar, the eggs in the fork of the trousers. Warmth, humidity, and shelter encourage the presence of the pest. The insect feeds by sucking blood, for which its large stabbing proboscis is well adapted. In an experiment with six newly-laid eggs, in half the insects were hatched in seven days, but the period may be lengthened to at least twelve days. Warburton kept a mature female insect alive for thirty days—it is not stated under what conditions;—but the writer found that the longest period during which the insect survived separated from a host was nine days ; under the same conditions eggs may remain active for forty days. Movements of the adult insect were charted in some instances, and the result did not bear out the statement that the parasite will show a purposive selection of its goal. They could climb the wall of a room to the height of three feet. The factors determining migration from the host are not known, and it would seem competition does not play a part ; 10,000 lice, for example, have been found on one shirt. The consequences of their infestation apart from the subjective symptoms caused may be important. Sepsis may be a serious accompaniment, and it is not to be forgotten that the spread of typhus has been shown to be due to lice.

Reference.—[1]*Brit. Med. Jour.* 1916, i 745.

PELLAGRA. *Sir Leonard Rogers, M.D., F.R.C.P.*

F. M. Sandwith[1] discusses pellagra from the point of view of its causation by deficiency of diet. He remarks there is no more evidence now in favour of its being an insect-borne disease than when Sambon suggested this theory in 1905. The theory of Alessandrine that it is a poisoning by a colloidal silica in drinking water from clayey soils also does not appeal to him or explain the incidence of the disease in Egypt, where Sandwith first drew attention to its prevalence among the poorest classes only, as in Italy.

The bacillary theory also lacks confirmation. He at first thought that it might be related to spoilt maize, but the discovery of the relationship of beri-beri to deficiency of some element in a rice diet led him to look for a similar explanation of pellagra. He recalls that as early as 1707 Pedro Casal recorded obtaining great relief by feeding the affected peasants on a more sustaining diet. Similarly, pellagra cases in all but advanced conditions may be cured, or apparently cured, by a liberal diet including meat. Recently Goldberger and others in America concluded that pellagra is essentially due to a deficiency of especially animal and leguminous proteins, and records

an example in which an improved diet eliminated the disease from an orphanage in America. Sandwith calls attention to the close relationship between ankylostomiasis and pellagra in Egypt, and suggests that the anæmic condition produced by the former may predispose to the latter. Finally, he records some feeding experiments in guinea-pigs which were inconclusive.

H. E. Bond[2] suggests on purely theoretical grounds that pellagra is an intestinal intoxication indicating antiseptic treatment.

J. F. Siler,[3] of the Thompson-McFadden Pellagra Commission, has investigated the prevalence of pellagra in Barbados, where the disease has greatly increased in the last few years, and apparently spread from the port of Bridgetown over the island, affecting almost exclusively the native coloured population, especially females in late life. The death-rate varied from 7·5 to 13·3 per 10,000 of population, being mostly of the acute and fatal typhoid type. Mosquitoes and sand-flies are plentiful, but simulium are absent from the island, which completely negatives Sambon's hypothesis. Fresh vegetables are plentiful all the year round, and no dietetic cause could be found, although the protein constituents of the food are in low proportion as compared with carbohydrates. The writer concludes that the Barbados records are in complete accordance with the theory that pellagra is an infectious disease communicated from person to person.

References.—[1]*Lancet*, 1915, ii, 905; [2]*Med. Rec.* 1916, i, 816; [3]*Amer. Jour. Trop. Dis.* 1915, Oct., 186.

PELVIC INFECTIONS IN WOMEN. *W. E. Fothergill, M.D.*

L. G. Bowers[1] brings out some points of great practical value. In cases of acute pelvic infection, he thinks the treatment employed by the family physician is often too active, and warns against too urgent efforts to produce free catharsis. The production of too violent peristalsis breaks down the protective adhesions and may generalize a peritonitic process which would remain localized if gently treated. "The important thing is to disturb the patient as little as possible." Chronic cases are treated even worse than acute ones. The use of tampons, douches, suppositories, posture, etc., gives only temporary relief, and the repeated acute congestions and inflammatory processes lead to gross pathological changes.

In the surgical treatment of pelvic infections, to operate during the acute stage spells disaster many times. We must give nature time to limit the infection by protective adhesions, and to develop a specific immunity. A beginning general peritonitis, as evidenced by fever and general or local tenderness, usually contra-indicates early surgical interference. The important principle in drainage is that a cavity should be drained at its lowest portion. Therefore pelvic collections of pus should be drained through the floor of the pouch of Douglas into the vagina, and not up-hill through the abdominal wall. The exception is when the pus is in front of the uterus and is enclosed by adhesions.

The drainage of pelvic infections by **Posterior Colpotomy** is much neglected, but is a most safe and useful operation. The pus or serum in the pouch of Douglas is evacuated by an incision just behind the cervix, near enough to it to avoid the rectum. There is a space of ¾ in. between the cervico-vaginal junction and the junction between the rectum and the posterior vaginal wall. Drainage is secured by inserting a stiff rubber tube bent on itself in the middle. A good-sized opening is cut in the outer aspect of each half below the bend. This tube is generally left in position for from five to seven days. It may be removed for cleansing, and the cavity may be irrigated before the tube is replaced. The patient should sit up in bed or, if this is impossible, the head of the bed should be raised. At the time of operation the pelvis should be explored with the finger through the incision, and any adhesions that may be retaining pus should be broken down. Walled-off pus cavities and pockets thus broken into will often liberate as much pus as the first incision did. When this is thoroughly done, this simple operation is often followed by complete cure, in the sense that no secondary abdominal operation for the removal of diseased appendages is required. But if there are recurrent attacks, if symptoms continue, and if tubes remain enlarged and tender, a radical operation may be required. This should be done in an interval between recurrent acute attacks of pelvic inflammation. The writer recommends excising the intramural portion of the tube from the uterine cornu when removing pus tubes. If the tube be simply tied at the cornu and cut across, the stump often gives trouble. If drainage is required at the radical operation, the floor of the cul-de-sac should be incised upon the point of a forceps or other guide inserted into the vagina, and a gauze drain should then be pushed down from the pelvis into the vagina. The abdomen is closed. The gauze drain is left *in situ* for five days, and very seldom need be replaced. When the cavity to be drained is anterior to the uterus and next the abdominal wall, it is to be drained through the abdominal incision. The writer advocates the administration of gas to the patient to facilitate the removal of gauze drains.

REFERENCE.—[1]*Jour. Amer. Med. Assoc.* 1915, ii, 1977.

PELVIC VARICOCELE. *W. E. Fothergill, M.D.*

J. A Wall[1] describes two varieties of varicocele in the female, primary and secondary. The primary type is not associated with other genital diseases. The other type is secondary to new growths or inflammatory processes.

Anatomical conditions explain the greater frequency of varicocele on the left side in the female as in the male. Chronic distention of the pelvic veins may be associated with persistent œdema of the ovary, and sometimes of the uterus. After a variable length of time this engorgement may end in sclerosis and finally in atrophy.

The patients complain of pain in the lower abdomen, aggravated by standing, and near the menstrual period. The pain subsides when

the patient lies down or when the menstrual flow has started. The physical signs being negative, these women are often relegated to the group of so-called neurotics. Leucorrhœa is often present. The co-existence of varicose veins in the legs facilitates the diagnosis, which, as in other conditions with few physical signs, must generally be made by exclusion. Chronic appendicitis is often confused with varicocele in the female, especially when the varicocele is on the right side. On opening the abdomen no veins may be seen, but the use of the Trendelenburg position is generally responsible for their disappearance, and if the table is levelled the groups of veins fill up and are easily recognized. The writer says "the treatment should only be surgical if we aim to obtain a permanent cure." But he does not say how the surgical treatment should be carried out. [So far as we know, ligaturing and excising the veins has not proved to be very satisfactory. Other veins become distended in course of time, and the patient's aches return. We consider that in the primary cases loose bowels and good general health comprise the only treatment for these aching pelvic veins.—W. E. F.] When the condition is secondary, the treatment is that of the primary lesion, be it a new growth or a result of infection The writer considers that varicocele in the female is "not so rare as is usually thought."

W. E. Fothergill[2] describes the same condition as the commonest of all the complaints of young women who seek the advice of the gynæcologist. The dull, aching pain comes and goes, generally on the left, but often on both sides. Generally associated with menstruation to begin with, it gradually comes to last throughout the intermenstrual period. The pain is aggravated by constipation, by standing, and by fatigue of all kinds. It is not relieved by pregnancy and parturition. It may disappear during periods of good general health, only to return whenever the patient is run down.

No physical signs are to be recognized by bimanual examination: but if the abdomen be opened for any reason, bunches of dilated and distended veins are seen in the broad and infundibulo-pelvic 'ligaments.' The pain is exactly comparable with that of varicocele in the male.

It has been usual to diagnose 'ovaritis' in these cases: but the pain occurs in women who have never had any infection of the pelvic organs, many of them being virgins. 'Ovaritis' must be secondary to some infection, either venereal, following abortion or parturition, or brought to the ovary by the blood-stream from a focus in some other part of the body. If a man has an infection of the testis, he has orchitis: but it would be wrong to say that he has orchitis when he has only varicocele. It is also quite wrong to say that a woman has ovaritis when she has only varicocele.

The treatment has in the past been dominated by the erroneous diagnosis. The patients have been douched, plugged, and blistered, and ovaries have been removed by the hundred because they were supposed to be inflamed. But who would blister a man's scrotum

for varicocele? Who would remove one or both testes because there were aching veins in their neighbourhood? Rest in bed is useless: the pain returns as soon as the patient is about again. In short, varicocele in the female is not amenable to treatment. It must be explained to each patient that the trouble is one of those which many women unfortunately have to put up with; and further, that it does not prevent successful childbearing, and that it varies according to the state of the general health.

References.—[1]*Surg. Gyn. and Obst.* 1916. ii. 62; [2]*Clin. Jour.* 1915, Mar. 31.

PENIS, SURGERY OF. *J. W. Thomson Walker, M.B., F.R.C.S.*

Priapism is defined as a condition of prolonged and persistent erection, which is usually painful, and is unaccompanied by sexual desire. It should be distinguished from recurrent transitory erections common in inflammatory conditions of the genito-urinary tract. The condition is rare, only about 170 cases being recorded in medical literature. Hinman[1] describes two cases, and gives the following classification: (1) Cases due to nervous causes: (*a*) from ascending peripheral stimuli (reflex); (*b*) from direct stimuli either to the spinal cord centre, or to the nervi erigentes or pudendi; (*c*) from descending cerebral stimuli, either direct or indirect. (2) Cases due to local mechanical causes: (*a*) thrombosis or pseudo-thrombosis; (*b*) hæmorrhage and hæmaturia; (*c*) new growths of the penis: (*d*) inflammatory swellings and œdema of the penis.

In analyzing the true cases of priapism recorded, Hinman found only 20 per cent were purely nervous in origin, and it was questionable whether a thrombosis had not occurred as the prolonging factor in some of these. Eighty cases (50 per cent) resulted from both nervous and mechanical causes, the former being usually the inciting, and the latter the prolonging, cause. He included in this category forty-five cases occurring in leukæmia. Forty-five cases (30 per cent) were of primary mechanical origin. The nervous cases had a shorter duration than the purely mechanical cases. Excluding cases of transitory erection of only a few hours' duration, priapism may persist for from two days to over two years. Over 50 per cent of mechanical cases (thrombosis, etc.) lasted between twenty and sixty days. Of the leukæmia cases, 80 per cent had a prolonged duration. Of the nervous cases, 85 per cent lasted less than ten days. There was slow gradual subsidence of the condition in one case, and rapid subsidence is stated to have occurred in 50 per cent of nervous cases. Of the mechanical group, 70 per cent of the non-operated cases had a slow and gradual recovery. Previous attacks of a few hours' duration occurred in 34 cases, 27 of which were in the mechanical group. In 70 per cent the corpora cavernosa alone was involved, without participation of the glans and corpora spongiosum. In a number of cases urinary symptoms (frequency, difficulty, or retention) were present.

Treatment by medicine has no effect, and even deep narcosis gives no relief. **Operation** has been performed in 34 cases. In one the dorsal arteries of the penis were ligatured, and cure resulted. In the remaining cases, incision of one or both corpora cavernosa was practised, with immediate benefit in all but two instances.

Curtis[2] describes a method of '*bloodless circumcision*' on either side of the median dorsal line. The prepuce is seized between two pairs of Spencer Wells forceps, the points of which are pushed right up to the level of the corona glandis, and the prepuce is split between the clamps, with scissors. The two lateral halves of the prepuce, thus formed, are separated from the glans up to the groove behind the corona glandis, and then clamped from below upwards, at a distance of about $\frac{1}{6}$ in. from its attachment in the circumcoronal region, the point of the clamp being directed upwards and inwards. A second and higher clamp similarly placed is applied, so that no portion of the prepuce is left unclamped. With a catgut suture threaded at each end with a needle, an interlacing stitch is placed in one flap proximal to the clamps, and commencing first to one side of the frænum, and a similar suture is placed in the other flap, the ends of both sutures being tied together on the dorsum. The clamps are removed, and the redundant skin is trimmed off.

References.—[1]*Ann. Surg.* 1914, ii, 689; [2]*Pract.* 1916, Aug., 101.

PERICARDITIS. *Carey Coombs, M.D., M.R.C.P.*

In an interesting clinical lecture on a case of pericarditis with effusion terminating a chronic nephritis, Chauffard[1] laid special stress on three points. First, he alluded to the special diagnostic value of skiagraphy (*see also* p. 44). This yielded a shadow of the shape depicted below (*Fig.* 103). Moreover, the outlines of this shadow were not disturbed by any pulsatile movements; they were quite immobile.

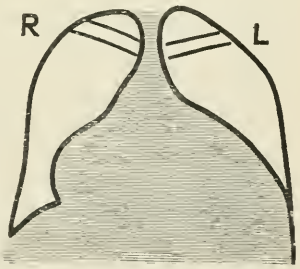

Fig. 103.—Orthodiagram from the front.

Secondly, friction was audible not only over the whole precordial region, but also on the back on both sides of the spine, principally to the left. This 'dorsal pericardial friction,' in Chauffard's view, has a dorsal origin, and is not merely transmitted from the front. It seems to be due to posterior pericarditis with effusion. The left lung is thrust to one side so that the distended sac of the inflamed pericardium comes into contact with the posterior thoracic wall. These conditions seldom occur except in the pericarditis that complicates Bright's disease.

Finally, he eulogized Marfan's method of puncturing the pericardium. Chauffard had never used this procedure before, yet he made two perfectly successful punctures, the first withdrawing 1100 c.c.

and the second 350 c.c. The patient is placed in a semi-sitting posture and supported by cushions. The site of puncture is on the median line below the apex of the ensiform cartilage, which serves as guide. The trocar is inserted from below and directed upwards, following the posterior face of the ensiform cartilage and sternum so closely as almost to touch it. The distance from the surface to the pericardium is, in adults, about 6 cm. As the liquid is evacuated, the patient is slowly raised, in such a manner as to allow the fluid to collect in front and below at the level of the point of the trocar. It is advisable that the puncture be preceded by subcutaneous injection of spartein or camphorated oil.

REFERENCE.—[1]*Presse Méd.* 1916, 9; also *Med. Press and Circ.* 1916, i, 464.

PERNICIOUS ANÆMIA. (*See* ANÆMIA, PERNICIOUS.)

PHARYNX, DISEASES OF. *J. S. Fraser, M.B., F.R.C.S.*

Tumours of the Nasopharynx.—Irwin Moore[1] remarks that angio-fibromata 'are composed mainly of a dense fibrous tissue embedded between connective-tissue cells. They arise by a broad base from the thick periosteum which lines the roof of the nasopharynx over a comparatively limited area corresponding to the basilar process of the occipital bone and the body of the adjoining sphenoid. They are very firmly attached to both periosteum and bone. As the tumour grows, the base increases in extent. Many authorities describe a 'capsule' to these growths. They are covered by an investing membrane, which consists of the mucous membrane lining the vault, frequently thinned away by the increasing pressure. There are many thin-walled vessels and cavernous spaces. Being devoid of a contractile coat these vessels do not contract when cut across. The central portion of the tumour appears to be much more vascular than the peripheral portion, and here the cavernous spaces predominate; hence the risk of dangerous hæmorrhage through cutting into or tearing the body of the tumour. In the earlier stages epistaxis is quite unusual.

Operation is performed through the mouth. With the soft palate tied back by two pieces of thin rubber tubing passed through the nostrils and out at the mouth, it is astonishing what an amount of room is available—quite as much as by splitting the soft palate. The base of the growth and its extensions should be peeled from the bone, along with the periosteum, by means of sharp periosteal elevators, starting posteriorly and working round and over it as far as the choanal margin, from behind forwards and from side to side. With the patient in the 'hanging-head' position, blood escapes by the naso-pharynx, and thus there is no need for tracheotomy or laryngotomy. By means of strong clamp forceps the main mass of the growth is seized and removed tearing away with it the nasal or other prolongations. If necessary, periosteal elevators passed through the nose into the choanæ may be employed to separate them. The operation should be performed rapidly, and no time be lost in trying to staunch the excessive hæmorrhage which invariably occurs, as the bleeding

ceases spontaneously as soon as the growth and its attachments have been removed.

Brown Kelly[2] records the case of a male, age 57, who had suffered from nasal obstruction for seven months. Three weeks before admission he had had very severe bleeding from the nose. The nasopharynx was largely occupied by a growth which impinged on the mouth of the right Eustachian tube, the corresponding ear being markedly deaf. Later a packet of 50 mgrms. of **Radium**—screened with 2 mm. of silver and covered with 2 mm. of rubber—was drawn into the nasopharynx by means of threads, so as to lie between the growth and the soft palate, and kept in this position for twenty-four hours. For a week afterwards the patient suffered a good deal from ulceration of the palate and fauces. Six weeks later he reported that his nose was free. A small rounded mass was still present, however, on the roof of the nasopharynx. Radium was again introduced for twenty-four hours. Two months later there was no sign of the growth, but its site of origin was indicated by an adherent crust of mucus. Radium was applied a third time for a period of twenty-four hours.

Durand and Gault[3] describe thirty-one cases of *malignant growths of the mesopharynx*, dealt with by a free and methodical excision *per vias naturales*. Ligature of the external carotid or preliminary tracheotomy are in the majority of cases needless. Good illumination is required. The chief danger is hæmorrhage, but all published cases demonstrate that it is but slight and easily controlled by compression or, if necessary, ligature.

Of sarcomata, the fasciculated variety is most frequently met with. This form is generally encapsuled, accompanied with little or no infiltration or glandular involvement, and amenable to buccal intervention. It sometimes has a tendency to pedunculation. Lymphosarcomata should not be attacked by the oral route. With epitheliomata in the early stage, when there is little or no glandular involvement, the buccal operation is satisfactory. In the advanced stage, all operative treatment is out of the question.

The situation of the growth may be : (1) In the velum ; removal is usually easy and complete. (2) From the tonsil (the most common). Here two conditions are met with : either the glands are small and mobile, and then one can and ought to operate, even when the primary growth is extensive ; or there is a large glandular mass fused with the jaw—abstention is then the rule. (3) Lingual tumours usually originate in the glossotonsillar sulcus ; excision by the buccal route is generally very easy. (4) Those arising from the posterior wall are for the most part the result of extension, and can be extirpated easily in consequence of the facility with which the posterior pharyngeal wall can be detached from the underlying structures.

The preparation of the patient consists in buccopharyngeal disinfection, removal of tooth stumps, use of nasal ointment, alkaline gargles, and sometimes prophylactic injections of gelatined serum, or chloride of calcium internally. The author prefers chloroform for

anæsthesia. Rose's position must be adopted. Laryngotomy is performed and Botey's trocar cannula (No. 5) inserted. Hæmorrhage is moderate, and especially venous in character. Preliminary ligature may be reserved for those cases where sternomastoid or retromaxillary adenopathy necessitates the opening of this region ; a ligature can then be applied to the commencement of the external carotid.

Encapsulated tumours can be enucleated with the finger after incision over their most prominent part. Hæmorrhage is usually arrested spontaneously after removal of the mass. In the case of a malignant tumour, connections and prolongations must be defined by critical palpation. This done, a vertical incision of the palate is made with a bistoury or thyrotomy scissors. An incision is then carried through the mucosa around the growth. The lower part of the incision extends from the median line to the base of the tongue, and passes outside the anterior pillar. This incision is deepened under ocular control. The bulk of the growth is now rapidly removed, and hæmorrhage controlled by tamponment, and if necessary by forceps-pressure (the application of forceps is not always easy). Michel's clamps, recently modified by Wagener, may be employed with advantage. They can be left in the wound, and even if swallowed will not damage the patient. The operative field is then explored to follow up possible prolongations or suspected points of infiltration, attention being directed to the posterior pharyngeal wall, the tonsillar recess, and the region of the internal pterygoid muscle, where infiltration is much to be dreaded on account of the special proneness to diffusion and recurrence.

Food is withheld on the first day. When the wound is extensive, alimentation is effected by a catheter passed through the nose. The oral cavity is irrigated with chlorated biborate of soda. Rhinolalia aperta and reflux of food by the nose soon tend to diminish ; it is quite exceptional to have to resort to prosthesis.

Mollison[1] remarks that *carcinoma of the hypopharynx* occurs as a rule in comparatively young women, and, unfortunately, cases are seldom seen till the growth is inoperable. The tumour gradually extends round the lumen and tends to spread downwards. The clinical picture is as follows : dysphagia of gradual onset ; saliva cannot be swallowed—this gives to the voice a characteristic thickness. A thin woman of thirty-five to forty-five, who complains of dysphagia and has hypersecretion of saliva, is suffering from carcinoma of the hypopharynx. Final diagnosis is made by direct examination.

Mollison describes a case in which, with a Hill's tube, the ulcer was seen to occupy almost the whole circumference of the hypopharynx. There was only a narrow strip of normal mucous membrane on the left posterior wall. Vertically the ulcer extended from the level of the lower part of the arytenoids to about half an inch below the level of the cricoid cartilage. No glands could be felt in the neck. Ether was administered by intratracheal insufflation. The skin and the subcutaneous tissues of the neck were infiltrated with a solution of novocain (0·5 per cent) and adrenalin.

An incision was made slightly to the right of the middle line from the level of the hyoid bone to within an inch of the suprasternal notch. From the upper end another incision was carried out along the hyoid bone to the anterior border of the sternomastoid. The triangular area of skin with the platysma was reflected outwards, thus exposing the carotid triangle. The pharynx was separated from the carotid vessels, and the fascia over the carotid triangle was sutured to the prevertebral fascia. The great cornu of the hyoid bone and the right ala of the thyroid cartilage were freed from their muscular attachments, and from the pharyngeal wall on their deep aspects, and removed. The superior laryngeal nerve was seen and easily avoided. The pharyngeal wall was opened (between two stitches) by a vertical incision at the level of the upper part of the thyroid ala : the growth was well seen. The right lateral lobe of the thyroid body was removed to give more room. The ulcer was excised with a quarter inch border of apparently normal mucous membrane all round, stripping the growth from the back of the cricoid. A strip of mucous membrane only an eighth to a quarter of an inch wide and two inches long was left connecting the pharnyx above with the œsophagus below. The reflected skin was now brought forward, and two horizontal incisions were made in it so that a flap was formed opposite the gap made in the gullet by the removal of the ulcer. The free edge of this flap was now sutured to the small strip of mucous membrane left in the hypopharynx. Lastly, the original incision was sutured as far as possible, and a rubber tube was passed from the mouth to the stomach. The patient was fed through the tube for about five days. The dressings were changed several times a day, and the skin-mucous-membrane junction was soon perfect. After three weeks the tube was removed, and the patient swallowed fluids and semisolids with comfort by holding a pad over the neck wound.

Six weeks later a further operation was performed in order to complete the lumen of the gullet by turning in the skin-flap. The base of the flap over the sternomastoid was divided, and the skin freed for a sufficient distance to allow of the edge being turned forwards and inwards behind the cricoid and fastened to the anterior edge of the mucous-membrane strip ; this was done by means of catgut sutures, threaded on cleft-palate needles and manipulated by means of a Lane's needle-holder. The upper free edge of the skin 'tube' was then sutured to the free edge of the pharyngeal wall above and the lower edge to the œsophagus below, in order to make the junction watertight. The rubber tube was once more passed to the stomach, and left in position for three days. On its removal, the patient swallowed fluids without any leakage, and finally was able to swallow like a normal person.

References.—[1]*Jour. Laryngol. Rhinol. and Otol.* xxx, 319 ; [2]*Ibid.* 1916, Aug. ; [3]*Proc. Soc. Franc. de Laryngol. etc.*, 1912, May 15 ; [4]*Jour. Laryngol. Rhinol. and Otol.* 1916, April.

PIGMENTED TUMOURS. (*See* Tumours, Pigmented.)

PITYRIASIS LICHENOIDES CHRONICA.

E. Graham Little, M.D., F.R.C.P.

The nomenclature of this group of diseases is still in an unsettled state, and it may be as well to mention that the case reported under this title by Wise[1] would perhaps be more commonly known by the earliest name applied to the group, 'parakeratosis variegata,' which forms also one of the three types described by Brocq as 'parapsoriasis,' and the latter designation seems likely to win in the competition. The disease is very like lichen planus, and was regarded by Crocker as a mere variant of that affection, for which reason he proposed to rename it 'lichen variegatus.' It is often mistaken for lichen planus, from which, however, its histological characters serve to separate it completely. It is one of the rarest of skin diseases. Its characteristic features are a nearly universal eruption of lichenoid lesions, which may involve the mucous membranes as well as the skin; it remains practically uninfluenced by any treatment, and therefore, once established, persists indefinitely; it is attended by intense pruritus with its concomitant evils, but does not materially depress the general health, so that persons may live for many years in spite of the disease.

In a few instances inunction of **Chrysarobin** ointment has temporarily improved the skin. In the present case, prolonged treatment with arsenic, the use of autogenous serum injections, the application of the rays from the Kromayer lamp, were all tried in turn with no effect. The diagnosis from lichen planus is best made by histological examination of sections, for the histology of the whole group named parapsoriasis is singularly constant notwithstanding the extreme multiplicity of the clinical types.

Stokes[2] also reports a case, with some interesting remarks on treatment. The disease had persisted unchanged for three years and a half, the eruption had become generalized within a month of onset, and the clinical and histological features established the diagnosis without any question. It was noted that a remarkable improvement took place after a venesection performed for the purpose of examining the blood, 175 c.c. being withdrawn. This was repeated four times at weekly intervals, with the most astonishing benefit to the eruption, which, in fact, almost disappeared. But the effect was not lasting, and with the recurrence of eruption, although bleeding was repeated in exactly the same way as before, the improvement was no longer effected. Autogenous serum was tried, with on the whole a bad influence on the eruption. The application of 10 per cent chrysarobin ointment resulted in a great diminution of rash. Iodide of potassium, on the other hand, exacerbated the disease markedly. No permanent improvement seems to have been obtained.

Graham Little[3] showed a typical case at the Dermatological Section of the Royal Society of Medicine which provoked an interesting discussion. The disease had appeared very suddenly, and was at first mistaken for an attack of measles, in a girl of eleven, and had

persisted for eight years. While most speakers confirmed the view that no treatment is of any permanent use, in one instance **X Rays** had given at least temporary relief.

References.—[1]*Jour. Amer. Med. Assoc.* 1916, ii, 159 ; [2]*Jour. Cutan. Dis.* 1916, 343 ; [3]*Brit. Jour. Derm.* xxviii, 243.

PNEUMONIA. *Lewis A. Conner, M.D.*

The past year has seen the production of very little new or original work. The most important has been the continuation of the investigation at the Rockefeller Institute, the earlier reports of which were reviewed in The Medical Annual, 1916. Cole and his co-workers have extended their labours and confirmed the division of the pneumococcus into four groups separated by their serological reactions. Furthermore, they have succeeded in producing a **Serum,** which in Type I seems to have a definite therapeutic value. Although the intelligent use of this serum demands first the classification of the infecting organism, this is a task which is not beyond the capabilities of any good hospital laboratory, and the results so far reported certainly justify the widespread use of the serum.

The administration of **Digitalis** as a routine measure as soon as the diagnosis has been made is becoming more general and has much to recommend it. A fatal termination is quite generally believed to be due to circulatory failure, and digitalis is probably the best drug we have to combat this condition. F. Tice[1] has studied the application of the Gibson rule : "When the arterial pressure, expressed in millimetres of mercury, does not fall below the pulse-rate, expressed in beats per minute, the fact may be taken as of excellent augury, while the converse is equally true." He found that the majority of cases fell within this rule, and that in some instances in which the arterial pressure fell below the pulse-rate the administration of digitalis was sufficient to bring it again above the pulse-rate.

Sisson and Thompson,[2] in a study of Friedländer bacillus pneumonia, point out the difficulty of making an absolute diagnosis, and call attention to the very small number of cases of pneumonia that can be reasonably considered to have been caused solely by the *Bacillus mucosus capsulatus.* They report four cases, and point out the severity of the infection, its rapid course, and usually fatal termination. According to their studies, the Friedländer bacillus occurs in from 5 to 10 per cent of all cases of pneumonia, considering it both as a primary and a secondary invader. It is a disease of late adult life, only one case having been reported in infants or children. The organism can be recovered from the blood in the early stage of the disease. The recognition is of importance because of its almost uniformly fatal outcome.

References.—[1]*Amer. Jour. Med. Sci.* 1916, cli, 91 : [2]*Ibid.* cli, 713.

PNEUMONIA IN CHILDREN. *Frederick Langmead, M.D., F.R.C.P.*

It is generally accepted that the mortality from pneumonia in children varies greatly with age, and is much higher during the first few years of life. This is borne out by an analysis, compiled by

R. Pisek and M. C. Pease,[1] of 1000 cases of pneumonia in children under six years of age at the New York Post-Graduate Hospital. The total mortality-rate was very high, being no less than 34·3 per cent. Of the 1000 cases, 445 were classed as bronchopneumonia, and of these 414 occurred in children under four years old, and more than half during the first year of life. The fatalities were confined to children under four, and were most numerous among children under one, of whom 52·2 per cent died. No child over the age of three died from bronchopneumonia, although there were 31 cases: but it is important to remember that only 'primary' bronchopneumonia was considered. Lobar pneumonia proved to be more common among infants than is generally supposed. Of 227 cases so classified, more than half occurred in children under two years old. The younger children were again those who were most liable to succumb. The mortality from lobar pneumonia in all affected children up to six years of age was 28·1 per cent, but excluding those under two was only 10·8 per cent. Empyema complicated the pneumonia in 41 of the 1000 cases. It followed bronchopneumonia on 6 occasions, and lobar pneumonia on the remaining 35.

The authors come to the usual conclusion that bronchopneumonia is pre-eminently a disease of the first two years of life, and after the third year is relatively uncommon, being then replaced by lobar pneumonia, cases of secondary bronchopneumonia excepted.

Treatment.—Another long series of cases, numbering 1500, has been scrutinized by A. R. Cunningham[2] to determine the value of the '**Fresh-air**' treatment of pneumonia. The patients had been treated at the Children's Hospital, Boston, between 1870 and 1915. The 'fresh-air' system was introduced at the end of 1905, and consisted at first in keeping the children in bed under an open window in a well-ventilated room which often became somewhat cold, and more recently in keeping them out of doors. There was little other difference in the general treatment of the cases admitted before 1906 and those admitted subsequently. When all the cases were included it was found that the mortality during the period of 'fresh-air' treatment was far greater than it had been before. Thus, prior to 1906 there were 874 cases with a mortality of 56 per cent; since 1906, 666 cases with a mortality of 82 per cent. As usual, the majority of deaths occurred among children under three. When moribund, under-nourished, and debilitated children were excluded from the statistics, the death-rates were more nearly equal, but still were to the disadvantage of the 'fresh-air' treatment. With this the proportion of children who developed empyema was also greater for almost every year of life.

On the other hand, R. G. Freeman,[3] writing of cases treated at the Roosevelt Hospital, New York, strongly favours open-air treatment, believing that it reduces the mortality and shortens the disease. At this institution, beyond an initial dose of castor oil, attention to bowels, and keeping the extremities warm, few of the cases receive

any medical treatment. He gives no figures comparable with those cited above. Of 25 cases of lobar pneumonia, 3 died (12 per cent); of 62 cases of bronchopneumonia, 16 died (21 per cent). The ages of the children are not given; moreover, 21 other cases were discharged uncured, and the proportion of those in which improvement occurred is not stated.

Marfan[1] considers the treatment of *bronchopneumonia* under two heads:—

1. *Measures Common to All Cases.*—He advocates first that the sick-room should be spacious, freely ventilated, well lighted, open to all the sunshine available, kept at a temperature of 62° during the day, and not allowed to fall below 56° at night. The windows should be widely opened five or six times a day for twenty minutes, but during that time the child's chest and head should be suitably covered, and a hot-water bottle placed at the feet. No pungent vapours as balsams or eucalyptus should be permitted. Secondly, the tendency to basal congestion should be obviated by changing the patient's position frequently. Thirdly, any nasal or pharyngeal catarrh should be treated by antiseptics, such as a few drops of **Eucalyptized Oil** (1–60) injected into each nostril. A suppurative discharge from the nose should be washed out with **Collargol** (1 per cent) twice daily. Stomatitis should be treated with **Hydrogen Peroxide** (1–10).

As a suitable diet for an infant with any febrile disturbance other than digestive, he recommends equal parts of milk and boiled sweetened water.

2. *Treatment of the Various Forms.*—The essential indications are the same in all forms of the disease—counter-irritation and stimulating expectorants. He distinguishes four varieties of bronchopneumonia: acute, hyperacute, subacute, and latent.

For the *acute form*, characterized by harassing dry cough, pronounced dyspnœa, high temperature, and foci of fine mucous râles, sometimes accompanied by tubular breathing, he recommends counter-irritation by means of **Very Hot Baths.** These should be given each time that the rectal temperature reaches 102·5°. The water should be at 100°, and the bath last six to ten minutes. The immediate effect should be a definite reddening of the skin. When suitable appliances are unobtainable, or if collapse threaten, the bath may be replaced by wet packs wrung out in water at a temperature of 80°.

Medicinally he uses the following:—

℞ Ergotini (Bonjean)	1 grm.	Mucilaginis	60 grms.
Strych. Sulphat.	·005 grm.	Aq. Dest.	q.s. 120 c.c.

In doses from one teaspoonful twice a day for infants under six months. to five teaspoonfuls twice a day for children over two years.

When diarrhœa is present he prefers:—

℞ Liq. Ammon. Acet.	12 grms.	Coffeæ Infus.	30 grms.
Tinct. Cinnamomi	1 grm.		

Four or five teaspoonfuls in the twenty-four hours.

For influenzal cases he recommends inunction of collargol :—

R	Collargol	3 grms.	Vaselini	āā 10 grms.
	Lanolini			

A piece the size of a filbert to be rubbed into the skin for five minutes until slight reddening occurs.

In the *hyperacute form* (capillary bronchitis, suffocative catarrh), in which there is often danger from suffocation, he employs **Mustard Baths** three or four times a day, in addition to the hot-water baths. These are prepared by putting a handful of black mustard powder into a five-gallon bath and rubbing down with a little tepid water until the essence of mustard begins to be given off, as shown by a sensation of heat and slight irritation of the eyes. When baths are not available, mustard packs, followed by rubbing with alcohol, may be substituted. This treatment should be accompanied by stimulation such as may be obtained by :—

R	Ol. Olivæ	8 c.c.	Camphoræ	5 grms.
	Ætheris Sulph.	2 c.c.	Guaiacol Crystal.	1 grm.

Two injections daily in doses of from ¼ c.c. to 1 c.c.

If this prove insufficient, he recommends :—

R	Caffeinæ Citrat.	·5 grm.	Aq. Dest.	10 c.c.

Doses similar to those of camphorated oil.

In the *subacute form*, which is rarely fatal, he advocates the same treatment as for the acute form, the hot baths being replaced by wet packs or mustard poultices when the temperature is between 100° and 102°.

The treatment of *capillary bronchitis* advised by Peiper[5] is certainly heroic. It consists in wrapping the child from head to foot in a towel dipped in a paste made by adding two handfuls of mustard flour to a litre of hot water. Collapse may result and necessitate the injection of camphor or caffeine. If reaction does not follow, the only resource is to puncture or sever a vein and allow 50 to 100 c.c. of blood to escape.

References.—[1]*Amer. Jour. Med. Sci.* 1916, i, 14; [2]*Boston. Med. and Surg. Jour.* 1916, i, 753; [3]*Amer. Jour. Med. Sci.* 1916, i, 1; [4]*Med. Press an Circ.* 1915, ii, 408; [5]Quoted in *Med. Rec.* 1916, i, 889.

PNEUMOPERICARDIUM. (*See* X-ray Diagnosis.)

POISONING, GAS. (*See* Gas Poisoning.)

POLIOMYELITIS. *J. Ramsay Hunt, M.D.*

During the past summer New York City was visited by an epidemic of poliomyelitis which was unprecedented in the number of cases reported (about 9418) and the high mortality (approximately 21 per cent). Special hospitals and laboratories were organized for the investigation and treatment of the disease under the direction of the Department of Health, and heroic efforts were made to check the

ravages of the epidemic. Notwithstanding a most rigid quarantine, the disease spread in all directions from the metropolis to neighbouring counties, and there were also sporadic outbreaks in other cities. With the advent of the cool weather of autumn the epidemic showed evidences of waning, and by the middle of October it had practically subsided and the public schools were officially opened. It is hoped that much will be learned from the study of this vast material, especially such facts as may serve to elucidate the all-important questions of transmission and treatment, and already a few preliminary reports have appeared in literature.

Etiology.—The nature, manner of conveyance, and means of prevention are reviewed by Simon Flexner.[1] Infantile paralysis is an infectious and communicable disease which is caused by the invasion of the central nervous organs—the spinal cord and brain—by a minute, filterable micro-organism which has now been secured in artificial culture, and as such is distinctly visible under the higher powers of the microscope. The virus exists constantly in the central nervous organs, and upon the mucous membranes of the nose and throat and of the intestines, in persons suffering from the disease; it occurs less frequently in the other internal organs, and it has not been detected in the blood.

The important fact has been determined that the mucous membrane of the nose and throat of healthy persons who have been in intimate contact with acute cases may become contaminated with the virus, and that such persons, without falling ill themselves, may convey the infection to others, chiefly children, who develop the disease.

At one time experiments seemed to show that insects, and particularly the stable fly, might withdraw the virus from the blood of infected persons and inoculate it into that of healthy individuals. But as the virus has never been detected in the blood of human beings, and later experiments with the stable fly have not confirmed the earlier ones, this means of escape of the virus must be considered doubtful. The usual means of escape is by way of the ordinary secretions of the nose and throat and, after swallowing these, with the discharge of the intestines. The virus enters the body as a rule, if not exclusively, by way of the mucous membrane of the nose and throat. Having gained entrance to those easily accessible parts of the body, multiplication of the virus occurs there, after which it penetrates to the brain and spinal cord by way of the lymphatic channels which connect the upper nasal membrane with the interior of the skull. Whether it ever enters the body in any other way is unknown.

The physical properties of the virus adapt it well for conveyance to the nose and throat. Being contained in their secretions, it is readily distributed by coughing, sneezing, kissing, and by means of fingers and articles contaminated with these secretions, as well as with the intestinal discharges. Survival in the secretions is favoured by weak daylight and darkness, and hindered by bright daylight and sunshine. It is readily destroyed by exposure to sunlight.

Since epidemics of infantile paralysis always arise during the period of warm or summer weather, they have been thought of as possibly being connected with, or dependent on, insect life. The blood-sucking insects have especially come under suspicion. While our present knowledge excludes insects from being active agents in dissemination, they nevertheless fall under suspicion as being potential mechanical carriers of the virus.

Studies carried out in various countries in which infantile paralysis has been epidemic all indicate that, in extending from place to place or point to point, the route taken is that of ordinary travel. This is equally true whether the route is by water or land, along a simple highway or the line of a railroad. In other words, the evidence derived from this class of studies confirms the evidence obtained from other sources in connecting the distributing agency intimately with human beings and their activities.

The virus is destroyed in the interior of the body more quickly and completely than, in some instances, in the mucous membrane of the nose and throat. In an undoubted case of the human disease, the virus was detected in the mucous membrane of the throat five months after its acute onset. Hence we possess conclusive evidence of the occurrence of occasional chronic human carriers.

Not all children, and relatively few adults, are susceptible ; young children are more so, generally speaking, than older ones, but no age can be said to be absolutely insusceptible. When there are several children, in a family or in a group, one or more may be affected, while the others escape, or seem to escape. The closer the family or other groups are studied by physicians, the more numerous, it now appears, are the number of cases among them. This means that the term 'infantile paralysis' is a misnomer, since the disease arises without causing any paralysis whatever, or such slight and fleeting paralysis as to be difficult of detection. The light or abortive cases, as they are called, indicate a greater general susceptibility than has always been recognized, and their discovery promises to have far-reaching consequences in respect to the means employed to limit the spread or eradicate foci of the disease.

The period of incubation is subject to wide limits of fluctuation : in certain instances it has been as short as two days, in others it has been two weeks, or possibly even longer ; but the usual period does not exceed about eight days.

Probably the period at which the danger of communication is greatest is during the very early and acute stage of the disease. Judging from experiments on animals, the virus tends to persist in the body not longer than four or five weeks, save in those exceptional instances in which chronic carriage is developed. Hence cases of infantile paralysis which have been kept under supervision for a period of six weeks from the onset of the symptoms may be regarded as practically free of danger.

Insusceptibility is conferred by one attack. Evidence derived from

experiments on monkeys is conclusive in showing that an infection which ends in recovery gives protection from a subsequent inoculation.

A certain measure of success has been achieved in the experimental serum treatment of inoculated monkeys. For this purpose, blood-serum derived either from recovered and protected monkeys or human beings has been employed. The serum is injected into the membranes about the spinal cord, and the virus is inoculated into the brain. The injection must be repeated several times in order to be effective. Unfortunately, the quantity of the human immune serum is very limited, and no other animals than monkeys seem capable of yielding an immune serum, and the monkey is not a practicable animal from which to obtain supplies.

The only drug which has shown any useful degree of activity is **Hexamethylenamine,** which is itself germicidal, and has the merit of entering the membranes, as well as the substance, of the spinal cord and brain in which the virus is deposited. But experiments on monkeys have shown this chemical to be effective only very early in the course of the inoculation, and only in a part of the animals treated.

Rosenow, Towne, and Wheeler[2] have made an important contribution to the *etiology* of epidemic poliomyelitis. After Landsteiner and Levaditi and Flexner and Lewis demonstrated independently that the causative agent could be passed through a bacterial filter, the disease was classed with those caused by a filterable, ultramicroscopic virus. The bacteria of ordinary size were no longer considered of etiological importance, and when obtained were discarded as post-mortem invaders or accidental contaminations. Wickman, after reviewing the earlier experiments with streptococci, says, "The time has fully arrived when such investigations should be discarded from the literature of the disease."

In 1913, Flexner and Noguchi cultivated and demonstrated microscopically a small filterable micro-organism with which they produced poliomyelitis in monkeys. They note that "the cultural conditions are those that apply more particularly to the bacteria," but do not attempt definitely to classify the micro-organism.

Rosenow has shown by the use of special methods that the specific localizing power of bacteria is an important factor in the etiology of various diseases, including those of the nervous system. The writers felt, therefore, that a re-investigation of the bacteriology of poliomyelitis by the newer methods was desirable. Accordingly, they have made a bacteriological study of throats, tonsils, blood, spinal fluid, the central nervous system, and other tissues in cases in the present epidemic, with particular reference to the infecting power of the bacteria isolated. As a result, a peculiar streptococcus from throats, tonsils, abscesses in tonsils, and from the central nervous system was isolated. Paralysis has been produced in animals of various species by intravenous and intracerebral injection of cultures of this organism, and lesions of the grey matter of their nervous

system have been demonstrated. From the nervous system of these animals the streptococcus has been isolated in pure culture, while their other tissues were sterile. It is remarkably polymorphous, and appears to grow large or small according to the medium in which it is grown, even after passage through a Berkefeld filter. Using the organism in its large form, paralysis has been consistently produced in animals known to be insusceptible to inoculation with material from epidemic poliomyelitis as heretofore practised. After paralysis had been produced in a series of three rabbits, the strain caused characteristic paralysis and lesions of poliomyelitis in monkeys.

The exact relation of their results to the facts already established as to the etiology of poliomyelitis cannot yet be definitely stated. It would appear that the small, filterable organism which has been generally accepted as the cause of poliomyelitis may be the form which this streptococcus tends to take under anaerobic conditions in the central nervous system and in suitable culture mediums, while the larger and more typically streptococcic forms, which investigators have considered contaminations, may be the identical organism grown larger under suitable conditions.

Treatment.—Flexner[3] also describes the method and the scientific basis of the **Serum Treatment.** It was demonstrated by Flexner and Lewis in 1910, and afterwards confirmed by other investigators, that monkeys which had recovered from an attack induced experimentally were not subject to successful reinoculation with the virus of the disease. They ascertained also that the serum of monkeys actively immunized with the virus, under conditions in which all symptoms of the disease were avoided, contained similar immunity bodies.

The next step taken was the determination by Flexner and Lewis that both the immune monkey, and the immune human serum which exhibited the neutralizing power for the virus, possessed also therapeutic properties for monkeys inoculated with the potent virus of poliomyelitis, in contradistinction to the normal serum from the same animal sources which was devoid of those properties. This aspect of the subject has been imperfectly developed up to the present time. Netter was the first to apply the data obtained by experiments on monkeys to the treatment of epidemic poliomyelitis in man. He has published the results obtained in a small series of thirty-five cases which he regarded as highly favourable to the method. He employed the serum from cases in which complete recovery from the acute condition has taken place some time—even as long as thirty years—previously. The injections were given subdurally as early after the appearance and recognition of the symptoms of poliomyelitis as possible. The dose of the serum, which must, of course, be sterile but need not be inactivated, should be regulated by the age of the patient, and will, in part, be determined by the quantity available. Probably doses ranging from 5 to 20 c.c. will be found suitable, the injection to be repeated several times at twenty-four-hour intervals according to clinical conditions and indications. The effects of the

immune serum should be sought in the checking of the progress of the disease, namely, the prevention or minimization of the paralysis when employed in the preparalytic stages, and the arrest of its extension when used in progressing paralytic conditions. Since the immunity substances have been determined by neutralization tests to persist in the blood for many years, it is probable, as Netter has indicated, that persons who have passed through an attack of poliomyelitis many years earlier may be utilized as sources of the serum; reasoning from analogy it would probably be advantageous to prefer persons whose attack was less remote, so as to insure as high concentration of the immunity bodies as possible. The conditions surrounding the injection of the serum into the meninges are identical with those observed in the analogous case of epidemic meningitis. Before each dose is injected, a suitable quantity of the cerebrospinal fluid is to be withdrawn, and the injections should be made slowly. In choosing the person who is to serve as the source of the blood from which the immune serum is to be derived, precaution should, of course, be taken to secure a healthy donor; it would be advisable to fortify the usual clinical examination by a Wassermann test.

Treatment by immune human serum has also been utilized by C. W. Wells.[4] In all cases the blood was obtained by puncture of the median basilic vein, collected in sterile glass containers, the serum separated by clotting, and kept at 36° until used. Wassermann tests and a careful bacteriological examination were made in each case before the serum was accepted as suitable for use. No preservative was used. Ten donors contributed the serum used in these observations.

TABLE I.—*Age of Donor, and Period of Time Elapsing between the Recovery from Poliomyelitis and the Contribution of Serum.*

Serum	Age of Donor, years	Time since Recovery from Poliomyelitis	Amount of Serum obtained, c.c.
A	29	3 weeks ..	300
B	36	32 years ..	125
C	24	2 weeks ..	100
D	17	2 ,, ..	100
E	44	39 years ..	100
F	7	2½ ,, ..	75
G	8	2 ,, ..	125
H	10	9 ,, ..	150
I	18	3 weeks ..	250
J	7	5½ years ..	100

The object of the use of immune serum is the neutralization of the toxic or other causative agent by specific antibodies in the serum injected. Consequently the indications are to administer it in such a

manner as to bring it into close and direct contact with the pathogenic agent. Heretofore the serum has been injected intraspinally; but as the cerebro-spinal fluid from acute poliomyelitis only infrequently transmits the disease in experiments on animals, a question arises as to the value of introducing therapeutic agents into the spinal canal. On the other hand, the lesions in the nervous system, essentially perivascular infiltrations as they are, would seem to call for intravenous injections. Further, the lesions in acute poliomyelitis are not confined to the nervous system, but involve also, frequently to a marked degree, various other internal organs, showing the systemic presence of the virus. For these reasons, intravenous injection alone, or in combination with intraspinal injection, appears to be the logical method of serum treatment. In the case of infants, in which it is difficult to introduce a needle into the vein, intramuscular injections may be substituted for intravenous.

TABLE 2.—*Method and Time of Injection, with Results of Treatment.*

Case	Age	Amount of Serum injected, c.c.			Day of Disease	Result as to Life
		Intra-spinally	Intra-venously	Intra-muscularly		
1	16 months	15	8	—	6	Recovery
2	4 years	16	15	—	5	Death
3	18 ,,	22	33	—	7, paralysis 1 day ..	Recovery
4	3 ,,	10	—	—	5	,,
5	2 ,,	15	—	—	9	Death
6	2 ,,	5	35	—	5	,,
7	2¾ ,,	—	8	10	2	Recovery
8	6 ,,	10	33	—	2	,,
9	7 ,,	6	26	30	3, paralysis 1 day	,,
10	24 ,,	—	70	—	4	Death
11	3 months	—	—	15	5	Recovery
12	2½ years	3	20	—	4	,,
13	7 ,,	16	34	20	3, paralysis 1 day ..	,,
14	3 ,,	—	12	24	Paralysis 1 day ..	,,
15	14 ,,	—	—	65	3, paralysis same day	,,

One cannot believe that a few cubic centimetres of immune serum contain any great concentration of antibodies for the virus of poliomyelitis, and it would seem rational, therefore, to employ as large doses of the serum as possible, especially in intravenous and intramuscular injections; obviously intraspinal injection must be limited to a few cubic centimetres.

In this series 50 c.c. was the largest dose; in most cases the dose was dependent on the quantity of serum on hand at the time. Still larger doses are advisable, and should be repeated daily in severe cases. In the majority, following the first intraspinal injection there

resulted an increase in the number of leucocytes in the spinal fluid usually with increase in the proportion of polymorphonuclear cells.

TABLE 3.—*Effect of Intraspinal Injections of Immune Serum on the Leucocytes of the Spinal Fluid.*

Case	Cells per c.mm. in Spinal Fluid before first Intraspinal Injection	Cells per c.mm. in Spinal Fluid 24 hours after first Intraspinal Injection	Cells per c.mm. in Spinal Fluid 24 hours after second Intraspinal Injection	Cells per c.mm. in Spinal Fluid 24 hours after third Intraspinal Injection
1	40	4130	230	20
2	48	217	—	—
3	47	175	—	—
4	302	171	240	—
6	84	165	110	—
7	18	40	—	—
9	278	149	—	—
16	119	189	73	—
5	—	64	—	20

In none of the cases were ill effects noticed, or symptoms indicating the presence in the serum of lysin or agglutinin for the corpuscles of the recipient. Precautionary tests for these substances should be carried out as a safeguard to the recipient. One was impressed with the marked improvement that followed within a few hours after intravenous injection; whether this was due to specific antibodies in the injected serum or only to the injection of so much serum has not been determined. To Wells the results of immune serum seem sufficiently favourable to warrant its use until more satisfactory measures are obtained.

S. J. Meltzer[5] recommends, on the basis of rather fragmentary experimental observation, intraspinal injections of **Adrenalin** solution in acute poliomyelitis. The technique of administration is as follows: As soon as the diagnosis is established, 2 c.c. of 1–1000 adrenalin should be injected every four to six hours. Before the first injection a fairly large quantity of spinal fluid should be withdrawn in proportion to the pressure prevailing in the spinal canal. The subsequent injections should be made without regard to the presence or absence of spinal fluid. Unless the pressure appears to be very high he advises that in advanced cases not much spinal fluid be withdrawn, because at this stage it may already contain some useful antibodies. All injections should be washed in with 2 c.c. of a normal salt solution; in presence of fluid in the spinal canal, the adrenalin will more readily spread all over the cord. In serious cases the quantity of adrenalin administered may be as much as 3 c.c. to each injection. In cases in which the encephalitic symptoms are predominant, however, greater care should be exercised with reference to the quantity of the injected adrenalin; it should be used in inverse proportion to the exciting

effect which the injections may produce. The injections should be continued until four to five days after paralysis has disappeared, or at least until no further reduction in the extent of the paralysis has taken plac (*see also* p. 12).

At the annual convention of the American Public Health Association, held in Cincinnati during the week of October 23 to 28, 1916, a Committee was appointed with instructions to prepare a report of "the present actual knowledge of the causes of poliomyelitis, the manner and agents by which it is spread, the best methods of treatment, and the best preventive methods." The following administrative procedures were recommended to control the disease: (1) The requirement that all recognized and suspected cases be promptly reported; (2) Isolation of patients in screened premises. The duration of infectivity being unknown, the period of isolation must necessarily be arbitrary. Six weeks has been recommended by the Conference of State and Territorial Health Officers with the Surgeon-General of the Public Health Service as sufficient, and this period has been generally accepted throughout the United States; (3) Disinfection of all body discharges; (4) Restriction of the movements of intimate associates of the patient, so far as practicable. This should include at least exclusion of the children of the family from schools and other gatherings; (5) Protection of children so far as possible from contact with other children or with the general public during epidemics; (6) Observation of contacts for two weeks after the last exposure.

References.—[1]Publication, Rockefeller Institute for Medical Research, New York City, 1916, July; [2]*Jour Amer. Med. Assoc.* 1916, ii, 1202; [3]*Ibid.* 583; [4]*Ibid.* 1211; [5]*N. Y. Med. Jour.* 1916, Aug.

Frederick Langmead, M.D., F.R.C.P.

Prognosis.—W. G. Stern,[1] writing of his experiences of a recent epidemic of this infection in Ohio, regrets the want of knowledge often displayed concerning its prognosis, whereby cure is too freely promised. It must be recognized that it is an acute contagious disease attended by a high mortality, and that in the vast majority of the cases permanent damage of a greater or less extent persists, rendering the victim a 'cripple.' During the epidemic, of 78 cases of which he had personal knowledge, only 2 could be said to have recovered completely. Partial recovery is the usual result, and no case is so bad that there is not some opportunity for improvement. As a rule the intensity of the paralysis is proportional to the severity of the attack, and the mildest cases improve most quickly. But this rule is not invariable, for no one can estimate the degree of neighbouring congestion and infiltration which is transitory. There is no time limit beyond which spontaneous improvement cannot take place, for Hoppe has reported a case where this occurred after twelve years. Even persistence of loss of reflexes and of the reaction of degeneration is no indication that the return of function will not take place, and much time and effort need not be wasted in testing electrical reactions.

Treatment.—Of serious import in prognosis are the loss of muscle-

tone, over-stretching of muscle and tendons, and the presence of bone or joint deformity. It is therefore important to place the limb in a position of muscle balance, or, when necessary, in a position of over-correction, to favour a contracture of the paralyzed or weakened muscle groups. He speaks highly of the Robert Jones splint in cases of dropped wrist, of the method of Silver for obtaining hyperabduction of the arm for a flail-like shoulder-joint, and of Volkmann's trough splints with horizontal bars to prevent rotation, as a means of preventing contracture of the Achilles tendon.

He protests against the recommendation that children should be put on their feet as soon as possible. Most is accomplished by rest in bed combined with massage, interrupted galvanism, resistance exercises, and muscle training. Misuse of muscles, over-work, over-stimulation, over-exertion, contractures, and deformities are particularly harmful. The prognosis should always be guarded, but proper treatment, followed by suitable supports, orthopædic operation, etc., will nearly always be followed by useful function of the paralyzed limb.

F. Hernaman-Johnson[2] also insists on the rule that a chronically overstretched muscle cannot recover (*see also* p. 54). He believes that when a muscle reacts to the small or medium capacities of the Lewis Jones instrument, its recovery is greatly hastened (and in some cases even determined) by daily rhythmical electrical stimulation: but the muscle must be maintained in the relaxed position. Exercises, whether voluntary or electrically provoked, must never be carried to the point of producing fatigue. The contraction of the muscle should not be less vigorous—with the same stimulus—at the end of a sitting than at its beginning.

The drug treatment of the disease is very disappointing, even in early cases. **Hexamine** is the only drug which has any scientific basis for its use or has been employed at all frequently: but its administration in human cases has not been distinctly beneficial. From theoretical considerations Beverly Robinson[3] recommends **Ammonium Salicylate** in 1- to 2-gr. doses every two hours for a child of two or three years, and O. Joerg[4] favours **Sodium Salicylate** in large doses: but neither writer records any success from their use in this disease. P. M. Lewis[5] has been injecting by lumbar puncture 30 minims of **Adrenalin** (1–1000) every six hours. No untoward effects were noticed except in a few cases in which the intraspinal pressure had previously been particularly high; in such, headache and vomiting might follow. He records three cases in which the results were encouraging, and suggests that the action of the drug may be due to its effect in relieving pressure around an inflammatory area and reducing the focus of inflammation. Max Talmey[6] deprecates this form of treatment, because of the fright and disturbance which lumbar puncture, so frequently repeated, provokes.

References.—[1]*Jour. Amer. Med. Assoc.* 1916, ii, 325; [2]*Lancet*, 1916, i, 185; [3]*N.Y. Med. Jour.* 1916, ii, 128; [4]*Ibid.* 286; [5]*Med. Rec.* 1916, ii, 202; *N.Y. Med. Jour.* 1916, ii, 286.

POTT'S DISEASE. *(See* SPINAL CARIES.)

PREGNANCY. *W. E. Fothergill, M.D.*

Pyelitis.—W. C. Danforth[1] contributes a useful paper on the pyelitis of pregnancy. He finds the first mention of the condition in Smellie's *Midwifery* in 1752, and gives a good bibliography which shows that most of the work on the subject is quite recent. Many mild cases doubtless escape observation. In other cases the condition is confused with appendicitis, and after labour is over it is often diagnosed as 'puerperal fever.'

The *Bacillus coli* is almost always the infecting organism. There are sometimes mixed infections, and streptococci, staphylococci, and gonococci have occasionally been found.

It is supposed that some degree of obstruction of the ureter is caused by the mechanical pressure of the pregnant uterus. This causes distention of the pelvis of the kidney and congestion of the organ. The resistance of the kidney being thus lowered, it is infected by bacilli carried to it in the blood-stream. It is a matter of fact that the right kidney is the one generally affected, and this may perhaps be explained on anatomical grounds. The explanations given are not convincing, nor is it easy to see why the pregnant uterus compresses the ureter at all. The facts remain that a renal infection is often aggravated or commences during pregnancy, and that these conditions generally recover spontaneously after labour. Some writers have considered the infection to be an ascending one, travelling up from the bladder. Danforth concludes that this is rarely, if ever, the case. He made cultures from the urine of normal gravid women on their admission to hospital. In 50 cases, 32 showed pure cultures of staphylococci, 2 showed pure colon bacillus, 3 showed a mixture of the two, and only 13 were sterile. In 14 further cases, 7 contained staphylococci. None of the women whose urines were examined showed any symptoms referable to the urinary tract. Danforth quotes Sieber's experiments on rabbits, which also show that the ureter may be partially obstructed and the bladder may be infected at the same time without ascending infection of the kidney. Further, recent work upon focal infections and their transmission to distant parts of the body by the blood-stream shows that this mode of transmission is much more frequent than was formerly supposed. In short, it may be granted that pyelitis during pregnancy is generally a blood infection. The features of diagnostic importance are the occurrence of a prolonged febrile state during the second half of pregnancy, with pain and tenderness in the right kidney region. The urine is acid, and contains colon bacilli; often, also, a considerable quantity of pus.

Most cases respond to palliative treatment. **Posture** is important, and the patient should lie, not on her back, but rolled well over, almost on her face. She should drink large quantities of water, and **Hexamethylenamine** may be given freely. [In many cases it pays better

to make the urine alkaline.—W. E. F.] Vaccines have proved to be disappointing. Danforth considers the ureteral catheter to be a valuable aid in draining the pelvis of a distended kidney. It should not be used until postural treatment and urinary antiseptics have failed.

The induction of premature labour is occasionally justified but is seldom necessary. Some writers have recommended nephrotomy as an alternative, and it has been done successfully by several operators. Nephrectomy has also been practised many times during pregnancy; but in cases of true pyelitis the pregnancy should be terminated long before nephrectomy is thought of.

Placental Bacteriæmia.—J. M. Slemons[2] points out that when the membranes rupture early the amniotic cavity may be infected during labour, and the placenta may be invaded by bacteria which pass through the amniotic membrane. The result is more serious for the fœtus than for the mother, and this complication is indeed a frequent cause of the death of the child within two or three days of birth. Slemons found placental bacteriæmia in three cases out of a series of twenty-one children that died during birth or soon after. He examined the three cases fully and established the presence of bacteria in the connective tissue of the amnion and chorion in contact with the vessels which run over the amniotic surface of the placenta. The mothers were hardly affected, but the children showed definite pathological changes characteristic of septicæmia. It was further established that the infection reached the placenta by the vaginal route, and not by the maternal blood-stream or by the Fallopian tubes. The writer discusses the cases of some previous observers and the relation of the condition to interpartum fever in general. Students of the causes of early infantile mortality will find that the subject demands their consideration.

Placenta Ablata.—J. Whitridge Williams[3] contributes a long paper on premature separation of the normally implanted placenta. He shows that this condition was first clearly distinguished from placenta prævia by Rigby in 1776, and mentions that interest was maintained by the death of the Princess Charlotte, daughter of George IV, in her first confinement in the year 1817. Holmes proposed in 1901 that the condition should be called 'placenta ablata' in order to make the nomenclature symmetrical with 'placenta prævia.' This undoubtedly good suggestion has not been generally adopted. As to etiology, Williams says he is prepared to admit that trauma may occasionally be a factor. He does not admit the effect of mental emotions. He considers that endometritis, when present, is merely an accidental complication; but that there probably exists some indirect connection between the toxæmic processes and the accident in question. He gives detailed accounts of two uteri removed by supravaginal hysterectomy, which showed degenerative arterial changes and hæmorrhagic infarction of the uterus and some of the other pelvic organs. Quite a number of cases in which the same or similar lesions have been described by other writers are collected and discussed, with others in

which blood has been found in the peritoneal cavity as well as in the organs. This important pathological work does not, of course, explain the causation of the condition completely, but it favours the hypothesis that it is generally a manifestation of a toxæmic state. More important for the practical man is the fact that the pathological findings show how it is that the only way to save the patient in bad cases is to **Remove the Uterus.** This treatment has been generally adopted of recent years in all severe cases of accidental hæmorrhage. Williams says that in past times such a course would have represented the height of radicalism; but, now that we are acquainted with the hæmorrhagic lesion of the uterus, operative interference is clearly indicated. In such cases the organ is so damaged by intramuscular hæmorrhage that it is unable to contract and retract. Thus its retention is practically synonymous with death from atonic hæmorrhage. Needless to say, there are plenty of slight cases in which no treatment is required beyond the usual obstetric measures.

References.—[1]*Surg. Gyn. and Obst.* 1916, i, 723; [2]*Jour. Amer. Med. Assoc.* 1915, ii, 1265; [3]*Surg. Gyn. and Obst.* 1915, ii, 541.

PROLAPSUS ANI. (*See* Rectum, Surgery of.)

PROSTATE, SURGERY OF. *J. W. Thomson Walker, M.B., F.R.C.S.*

Wildbolz[1] warns against ascribing all cases of prostatitis to gonorrhœa. Bacteria of all kinds may reach the prostate through the blood or lymph channels, from distant foci. The urine may frequently be found quite normal. In the last ten years, Wildbolz has seen 14 cases in which acute prostatitis had developed, consecutive to epidemic influenza. In the majority of 22 other cases, tonsillitis or bowel trouble had preceded the prostatitis. Suppuration occurred in only 5 cases. One had multiple styes before the development of the prostatitis, and staphylococcus osteomyelitis developed during the course of the disease. Another patient had a furuncle on the neck, and a consecutive prostatitis and perinephritic abscess, with staphylococci in all. The symptoms of metastatic prostatitis are pressure and pain in the perineum and rectum, with frequent micturition. In some cases, sudden retention of urine is the first symptom. Terminal hæmaturia is frequent. There is marked general disturbance, with or without fever. The prostate is very tender, enlarged, soft, elastic, and the seminal vesicles may be enlarged. The normal condition of the urine, with the above symptoms, indicate the metastatic nature of the prostatitis.

An editorial article in the *American Journal of Surgery*[2] discusses *prostatic calculi.* In regard to the calculi arising within the gland, which are generally regarded as arising from the deposit of phosphates and calcium carbonate upon the corpora amylacea, there is no proof that lime deposit occurs apart from inflammation. The writer holds that a clearer conception of the pathology of the condition will be obtained if it is regarded, not merely as one of prostatic calculi, but rather as calculous prostatitis. Inflammation is always present,

whether the stones provoke the inflammation or take origin in it. Prostatic calculi may be present, and may even be passed by the urethra, without causing symptoms. They may cause perineal pain or discomfort, or pain on defecation, or pain radiating to the thigh, testicles, or rectum; or there may be sharp pain at the end of the penis after micturition. Terminal hæmaturia or attacks of bleeding may occur, and purulent discharge and the symptoms of cystitis may be present. Attention is drawn to the difficulty in *x*-ray diagnosis, and to the value of ascertaining by a number of exposures, with the patient in different positions, whether the shadow is fixed or movable. If movable, the stone is free within the bladder, and is therefore not prostatic. The writer also holds that in purulent prostatitis the absence of all signs of urethral infection for a long period of time preceding, is strongly suggestive of prostatic calculus. The perineal route of approach is favoured, in preference to the suprapubic.

A review of '*prostatisme sans prostate*,' or 'prostatic symptoms without enlargement of the prostate,' is given by Randall.[3] The obstruction is by a bar at the outlet of the bladder, which may be fibrous or glandular, and there may also be atrophy of the prostate gland. The author believes that in every case of bar-formation there are underlying changes in the prostate, of a similar character and having the same origin. He also insists on the close similarity of the symptoms to those of ordinary prostatic hypertrophy. The removal of the obstruction at the neck of the bladder is indicated. Total prostatectomy is not, he holds, warranted, both on account of the age of the patient being frequently within the procreative period, and because of the magnitude of the procedure. There are three other classes of corrective measures: (1) Excision of the obstructing bar by means of Young's urethroscopic median bar excisor; (2) Chetwood's galvano-cautery incision; (3) Destruction of the obstructing portion by means of the high-frequency cautery.

Wiener[4] is a strong advocate of **Suprapubic Prostatectomy** in two stages, and states that he was "among the very first to practise and advocate the operation." An extensive review of the literature of the subject is given, and the author concludes that "two-stage prostatectomy is slowly but surely becoming the operation of choice with an ever-increasing number of surgeons. But unfortunately some still do the one-stage operation in many of these cases, and, as a result, lives that should be saved by prostatectomy are added to the mortality list of the operation." Holding these views, the author looks upon two-stage prostatectomy as the operation of choice in all cases of prostatic hypertrophy. In reply to the suggestion that if the patient is in good condition the operation should be done at one sitting, Wiener denies that any of the tests, or any examination, will show if the patient is able to survive the shock of the operation. There are, he states, no reliable statistics to compare the mortality of the one-stage and two-stage operations. [It would, however, be interesting and pertinent to compare the statistics of this out-and-out

two-stager with those published by surgeons known to practise the one-stage operation, with an occasional lapse to two stages in selected cases.—J. W. T. W.]

Simpson[5] enters a plea for **Early Operation** in enlarged prostate. The results, he holds, depend very largely on the stage of the disease at which the cases are sent to the surgeon. If a patient is complaining of nocturnal frequency, loss of power in the stream, and perhaps a little pain on micturition, and the prostate is enlarged, is operation justifiable? The argument in favour of the operation at this stage is the low mortality—probably under 5 per cent. If palliative treatment be adopted, it cannot be said that operation will not be necessary at a later date for retention, cystitis, or hæmaturia, and it is fairly certain that the mortality is then distinctly higher. The argument against early operation is, that many patients go on for years with occasional catheterization, and live in comparative comfort; that it is not much use to inform the patient that the mortality is only 2 per cent, unless you can assure him that he will not be one of those two; that operation can always be performed later, if this should be found necessary.

Simpson has operated on 26 cases, with the following results: 2 died from the operation (8 per cent); 13 are quite well at present after two to six years; 4 have died since operation; 2 were well for some years, but cannot now be traced; 5 cannot be traced. The only disability after early operation is, that the patient may have to get up once or twice at night.

According to the author, most modern text-books do not give a clear lead, or imply that palliative treatment should first be tried. The following quotation from a modern text-book seems clear enough: "Prostatectomy should be performed whenever the prostate is recognized as enlarged, while the urine is still aseptic, and before the kidneys are damaged by back pressure. It is unnecessary to wait until residual urine appears, or until the patient is becoming worn out by loss of sleep."

Gordon[6] records six cases in which the orifice between the bladder and the prostatic cavity, after prostatectomy, was contracted or occluded. He recommends the removal of the crescentic flap formed by the trigone, or splitting it back, allowing the flaps to drop back, and holding them in place by a Hagner bag, which is used to control hæmorrhage, but which is ideal for this purpose.

References.—[1]*Jour. Amer. Med. Assoc.* 1916, i, 927; [2]*Amer. Jour. Surg.* 1916, May, 161; [3]*N. Y. Med. Jour.* 1915, ii, 1177; [4]*Ann. Surg.* 1916, i, 558; [5]*Brit. Jour. Surg.* Jan. 1916. 558; [6]*Surg. Gyn. and Obst.* 1916, i, 620.

PRURITUS. *E. Graham Little, M.D., F.R.C.P.*

For the symptomatic treatment of pruritus, Unna[1] considers **Monochlorbenzine** the most effective application. It should be dissolved in alcohol in solutions of 1 to 5 per cent. and sprayed upon the itchy surface. If the skin is very dry, the addition of an oil is desirable,

and the following formula is recommended. The mixture must be well shaken :—

℞ Magnesii Carbonat. 2·5 grms. Olei Rapæ, q.s. ad. 100 grms.
Monochlorbenzini 5·0 grms.

This ointment is also recommended :—

℞ Acidi Nitrici 1·0 | Eucerini (anhydrous)
Glycerini āā 100

In the pruritus of jaundice, internal medication is effective on the lines of this prescription :—

℞ Sodii Chloridi 40·0 Potassii Chloratis
Calcii Chloridi 1·0 Sodii Bicarbonatis āā 8·0

M. et fiat pulvis. Dissolve one teaspoonful in two quarts of water, and drink during the day.

In the specialized *pruritus of the vulva*, Heusler Edenhuizen[2] notes that the secretory surfaces, e.g., the clitoris, inner side of the labia, and the perineum are sites most often affected, and regards retention and decomposition of these secretions as the exciting cause. Treatment accordingly is directed to removing these products and sterilizing, and especially drying, the surfaces, the most effective means for this latter course being the application of a desiccating powder, such as **Zinc Oxide.** Oil should be used to the meatus urinæ and anus before micturition and defæcation. Sterilization is promoted by the application of 10 per cent **Tinct. Iodi.**

References.—[1]*N. Y. Med. Jour.* 1916, i, 998 and 1045 ; [2]*Med. Rec.* 1916, i, 971.

PROTOZOA, INTESTINAL. *Sir Leonard Rogers, M.D., F.R.C.P.*

C. M. Wenyon[1] has written a useful description of the common intestinal protozoa of man, which have come into prominence on account of the number of soldiers coming to England from the Near East who show infection by them, and he illustrates them (*Figs.* 104, 105). In a further paper[2] he gives the numbers of these organisms found by him in the examination of the stools of 556 cases. The specimens did not reach him until from three to twenty-four hours after they were passed, so active amœbæ were rarely found, but only the encysted forms. *Entamœba coli* was the most common, namely in 217 cases, *E. histolytica* in 60, *Amœba limax* in 6. *Lamblia intestinalis* were met with in 89, *Trichomonas intestinalis* in 9, *Tetramitus mesnili* in 4, and *coccidia* in 16. *E. histolytica* as the active agent of amœbic dysentery is by far the most important, and Wenyon found that the cysts of this organism nearly always disappeared under adequate treatment with emetine, although occasionally as much as twelve 1-gr. doses may be required, and the danger of the infected patients becoming chronic carriers may thus be averted. The same writer, in a further note,[3] describes another human coccidium belonging to the eimeria. B. R. G. Russell deals with the intestinal disorders

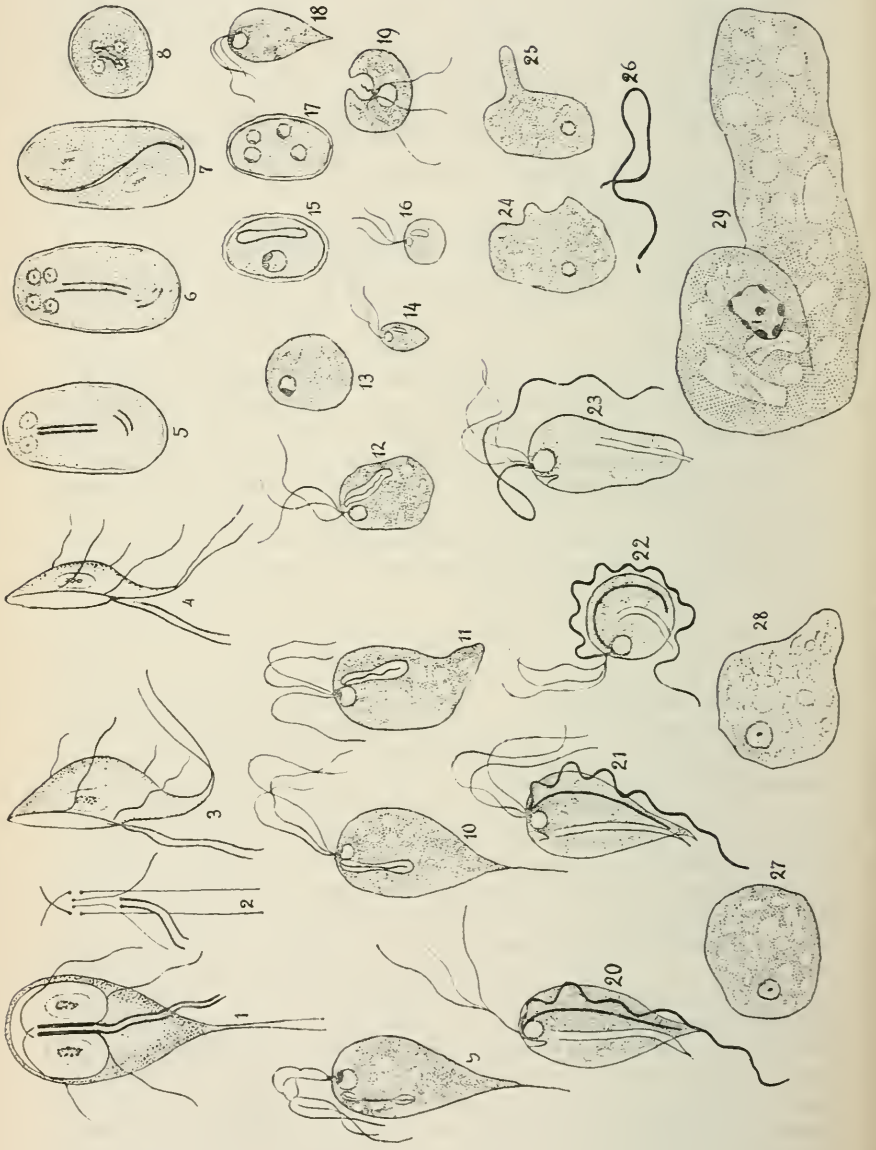

Fig. 101.—The common intestinal protozoa of man. (*C. M. Wenyon.*)

DESCRIPTION OF FIG. 104.

(All the figures have been drawn to one scale (shown at bottom of *Fig.* 195) with the exception of Nos. 54 and 55, which are only half the size they should be. An ordinary human red blood-corpuscle on same scale is shown at Nos. 48 and 56 for comparison.)

Lamblia Intestinalis (*Nos.* 1–8).

1. Surface view showing sucking disc, two nuclei, and eight flagella.
2. Origin of flagella as seen in stained preparations. They are represented as being more spread out than is actually the case.
3. Side view of thick form.
4. Side view of narrow form.
5. Encysted form with two nuclei.
6. Encysted form with four nuclei.
7. Encysted form containing two flagellates.
8. Appearance of cyst when viewed on end. The cysts are sometimes shorter in proportion to their breadth, and much more definitely egg-shaped, than represented in the plate, with one end slightly narrower than the other.

Tetramitus Mesnili (*Nos.* 9–19).

9. Form with overlapping lips of cytostome.
10. Form showing flagellum in cytostome.
11. Form in which posterior filamentous extremity is retracted.
12. Still further retracted form.
13. Rounded form in which flagella are lost so that the resemblance to a small amœba is marked.
14. Very small form of normal shape.
15. Encysted form with single nucleus and cytostome visible.
16. Very small round form.
17. Possibly encysted form with four nuclei.
18. Intermediate form of normal shape.
19. Appearance of flagellate when viewed on end, the cytostome with the incurved lips shown clearly, as also the flagellum within.

Trichomonas Intestinalis (*Nos.* 20–26).

20. Flagellate of normal structure; the three flagella appear to have a common base, possibly due to their being twisted round one another.
21. Flagellate of normal structure; the three flagella are free in their entire length.
22. Rounding-off form with undulating membrane running round margin.
23. Degenerating form; the large flagellum has broken loose from the undulating membrane, so that the flagellate has the appearance of having one large and three smaller flagella.
24. Further degeneration: the flagella and axostyle are lost, so that the appearance is of an amœba with undulating border.
25. Amœboid form throwing out the finger-like pseudopodium, which rapidly passes down side of body into dotted positions, where it disappears.
26. Detached flagellum.

Entamœba Coli (*Nos.* 27–29).

27. Small entamœba of roughly spherical form and vacuolated cytostome.
28. Small entamœba forming pseudopodium with no distinction between ecto- and endo-plasm.
29. Large entamœba of irregular shape,

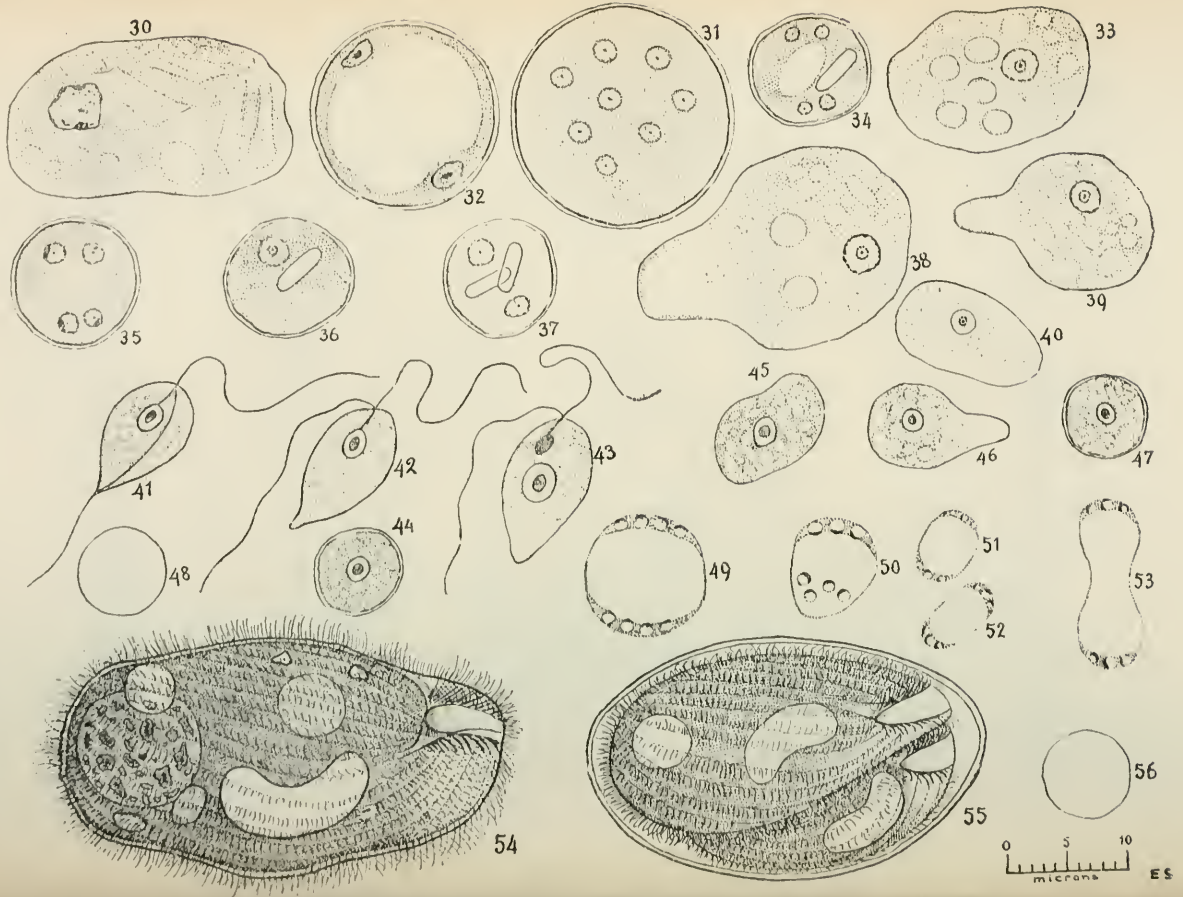

Fig. 105.—The common intestinal protozoa of man (*continued*). (*By kind permission of 'The Lancet.'*)

DESCRIPTION OF FIG. 105.

Entamœba Coli (*continued*) (*Nos.* 30–32).

30. Large entamœba with slit-like rectangular vacuoles.

31. Encysted form as it appears in the fæces. This is the form most commonly observed, and which is most useful for diagnostic purposes.

32. Encysted form of abnormal type with large central vacuole. In other cases there may be several vacuoles, and the vacuolation has the effect of retarding nuclear division, as such forms usually have only two, or possibly four, nuclei.

In *E. coli* infections it is generally only the completely developed cyst with eight nuclei which is passed in fæces. The earlier stages of development with one, two, and four nuclei take place in the large intestine before the cysts escape.

Entamœba Histolytica (*Nos.* 33–40).

33. Large tissue-invading form ('tetragena' form) containing five red blood-corpuscles.

38. Large tissue-invading form with ectoplasmic pseudopodium and containing two red blood-corpuscles.

39. Small form of intermediate size with ectoplasmic pseudopodium.

40. Small 'minuta' form as seen in post-dysenteric conditions.

34. Encysted form with four nuclei, chromidial body, and vacuole.

35. Encysted form with four nuclei. It is distinguished by its smaller size from the four-nuclear stage of *E. coli*, which, however, is rarely passed in the fæces.

36. Encysted form with one nucleus and chromidial body.

37. Encysted form with two nuclei and two chromidial bodies.

The encysted forms begin to appear as the acute dysenteric symptoms subside, and are thus very characteristic of the infection in carrier cases. It is important to note that they are much smaller than the cysts of *E. coli*. In *E. histolytica* infections it is usual to find passed in the fæces cysts in all stages of development.

Cercomonas, *Bodo*, *Prowazekia* (*Nos.* 41–44).

41. Cercomonas. The backwardly directed flagellum is adherent to the body. There is only a single nucleus.

42. Bodo. The two flagella are free, and there is only a single nucleus.

43. Prowazekia. The two flagella are free, and there are two nuclei.

44. Encysted form of either of above three flagellates.

Amœba Limax (*Nos.* 45–47).

45. Form without pseudopodium and characteristic 'limax' nucleus.

46. Form with pseudopodium.

47. Encysted form.

48. Red blood-corpuscle to show relative size of objects in plate.

Blastocystis Hominis (*Nos.* 49–53).

49. Large spherical form with several nuclei in semilunar protoplasm at opposite poles.

50. Somewhat triangular form with many nuclei.

51. Small oval form.

52. Small elongated form.

53. Elongated dividing form.

This organism is of a vegetable nature, but under certain conditions degenerating flagellates and small amœbæ, or the encysted forms of these, by the development of a large central vacuole will closely simulate the true blastocystis.

Balantidium Coli (*Nos.* 54–55).

54. Free ciliate as it lives in lumen of gut and in tissues.

55. Encysted form containing two ciliates as passed in fæces.

56. Red blood-corpuscle as in No. 48.

due to intestinal protozoal infection,[4] and describes several cases with infection by the *E. histolytica.*

A. M. Kennedy and D. D. Rosewarne[5] write on *Lamblia intestinalis* infections from Gallipoli; they found that in 12 out of 136 cases invalided for 'dysentery' the condition appeared to be dependent on this organism, which they describe in detail, and they discuss the disputed question as to whether they have any pathogenic action, being inclined to think they have. Wenyon's double-strength Gram's solution is useful for staining the encysted forms. H. B. Fantham[6] writes on the protozoal parasites found in the stools of 1305 dysenteric patients, mostly from Gallipoli. *E. histolytica* were found in 38. *E. coli* in 211, *Lamblia* in 471. *Blastocystis enterocola* in 198, and other forms in from 1 to 4 cases. Annie Porter[7] has also studied *Giardia (Lamblia) intestinalis* in the stools of soldiers, and gives charts showing the variations in the number of the cysts found from time to time in the stools of seven cases, finding them more uniform in liquid stools, in which they amounted to millions. She considers them to be of pathological importance, and draws attention to the difficulty of destroying them in the bowel.

References.—[1]*Lancet*, 1915, ii, 1173; [2]*Jour. R.A.M.C.* 1916, 445; [3]*Lancet*, 1915, ii, 1404; [4]*Ibid.* 1916, i, 1161; [5]*Ibid*, 1163; [6]*Ibid.* 1165; [7]*Ibid.* 1166.

PSORIASIS. *E. Graham Little, M.D., F.R.C.P.*

Cook[1] contributes a close study of ten cases of psoriasis, in four of which pyorrhœa was present and the entamœba demonstrated. In two others the entamœba was found but there was no pyorrhœa. All the cases were treated with **Emetine,** injected hypodermically.

Disappearance of the psoriasis *pari passu* with the cure of pyorrhœa was noted in three cases where entamœba had been demonstrated, and in the fourth no improvement in pyorrhœa or psoriasis resulted after three courses of emetine, and the patient declined further treatment. In one case the patient had a concomitant seminal vesiculitis of bacterial origin, which was treated with autogenous vaccines, and vesiculæ and skin responded satisfactorily. In one case fistula in ano with purulent discharge was found, and after operation, by which the fistula was cured, the psoriasis disappeared. In one case removal of infected tonsils was followed by dispersal of the skin eruption. Syphilis was present in one case, but the psoriasis was unaffected by antisyphilitic treatment. The author concludes from these data that psoriasis may be caused by various infections, the organisms most likely to be inculpated being the staphylococci and streptococci.

Reference.—[1]*N. Y. Med. Jour.* 1916, ii, 253.

PSYCHONEUROSES OF WAR. (*See also* Shell Shock.)

J. Ramsay Hunt, M.D.

Perhaps no other group of diseases has awakened greater interest at the present time than the various psychoneuroses of war; on account of their frequency, their varied symptomatology, and the

interesting pathological and psychopathological questions involved. The whole question, too, is one o great economic importance from the standpoint of permanent disability and compensation. This group includes the cases of neurasthenia, hysteria, traumatic neuroses, the minor and borderland psychoses, and certain special clinical types, e.g., shell shock, battle shock, and the war neuroses. In all these various forms the general character of the symptoms is the same as in the neuroses of civil life, but receiving a special imprint, or manifesting a greater severity, on account of the extraordinary etiological conditions of modern warfare.

F. W. Mott,[1] in the Lettsomian Lectures, contributes a most interesting study on *the effects of high explosives upon the central nervous system*. In considering the effects of high explosives it is absolutely necessary to take into account the state of the nervous system of the individual at the time of the 'shock.' A neuro-potentially sound soldier in trench warfare may, from the stress of prolonged active service, acquire a neurasthenic condition ; or if there is a tendency to a neurasthenic condition, either acquired or more or less inborn, an emotional experience such as fright is more liable to develop the symptoms of a functional neurosis or psychosis. The effects fall into three groups : (1) Immediately fatal from pieces of shell, stones, rocks, or portions of buildings striking the individual ; (2) Cases in which the detonation of high explosives has caused wounds and injuries of the body, including the central nervous s stem, which have not been immediately fatal ; (3) Injuries of the central nervous system without visible injury, which includes the functional neuroses and psychoses.

The cerebrospinal fluid serves to equalize the pressure throughout the whole craniospinal cavity ; moreover, at the base of the brain, where the vital centres of the medulla are situated, it acts as a water cushion, protecting them from the shock of commotion and concussion. It also serves as a self-adjusting mechanism by maintaining a uniform equalization of the blood-supply to the nerve elements during t e rhythmical variations of respiration and circulation. This fluid is incompressible, and under ordinary conditions of pressure from without serves as a perfect protective mechanism ; but when large quantities of these high explosives are detonated, an enormous aerial compression is instantly generated, and it is quite possible that this may be transmitted to the fluid about the base of the brain and cause shock to the vital centres of the floor of the fourth ventricle, causing instantaneous arrest of the functions of the cardiac and respiratory centres. Primary air compression, by which men are sometimes hurled into the air, must also be considered ; the blow on the body, especially over the heart and abdomen, may cause instant death.

The whole of the neurons of the central nervous system may be primarily divided into these two groups : (1) Neurons of the first type, which may again be divided into sensory or afferent projection, motor or efferent, and association neurons ; (2) Neurons of the second

type, or intercalary. Shock affecting one part of the central nervous system may be transmitted through anatomically and functionally correlated neurons to remote parts. In hæmorrhage into the internal capsule we have a sudden irruption of blood cutting through the pyramidal efferent system of fibres, resulting in a flaccid paralysis of the opposite limbs; the shock effect has been transmitted to the intercalary neurons at the base of the posterior horn of the spinal cord, and for the time has suspended the normal reflex tonus, that is to say, dissociation of the sensory projection fibres of the reflex arc has occurred. Another example is the occipital region of the skull. The two occipital lobes are anatomically and functionally correlated, and the injury of one lobe causes a functional dissociation by the shock effect transmitted through the association fibres of the splenium. This temporary dissociation by shock of anatomically and functionally correlated systems of neurons has been termed by Monakow diaschisis.

The researches of Ross Harrison on the living neuron and its growth render it possible to accept as a provisional hypothesis the theory of attraction and retraction of dendrons as an explanation of association and dissociation. The neuron when damaged by injury or disease shows various changes in the appearances of the cells, whether the fibril method of staining be adopted or the Nissl granule method—e.g., if the processes of the cell be cut, the living neuron is wounded, and the body of the cell, after it has been killed by the process of fixation and hardening, exhibits changes; likewise, if the neuron has been damaged by a poison, changes are seen, but there is nothing specific about these changes, e.g., one could not recognize any difference in the perinuclear chromatolysis of lead encephalitis, alcoholic psychosis, experimental anæmia, and section of the axons of nerve-cells.

Severe concussion can not only cause immediate dissociation of the cortical perceptor neurons, producing unconsciousness or a disturbance of consciousness, but for a varying period of time it can destroy the power of recollection of perceptions prior to the shock. There is a retrograde amnesia, and in very severe cases of shell shock there may be a complete loss of memory both as regards recollection and recognition. The loss of recollection may be attributed to dissociation of the higher association systems of (pyramidal) neurons, which form a sheet of cells of three layers covering the whole cortex cerebri. The loss of recognition may be attributed to a dissociation between the cortical perceptor systems of neurons, and in complete loss of consciousness of the external world there is dissociation of all the afferent projection fibres of subcortical neurons from the perceptor systems of neurons. Functional blindness and deafness, which often persist when consciouness returns, may be due to one afferent system remaining dissociated.

The delicate granules filling the nerve-cells have been termed 'neurobions,' as if they were independent living units, but this is theory. It is, however, conceivable that violent concussion transmitted to the cerebrospinal fluid which forms the circumambient

medium of such a complex mechanism as the living nerve-cell, could cause a violent oscillation of the neurobions and a loss or disturbance of their functions of variable duration according to the severity of the shock.

It is known that a continuous supply of oxygen is essential for consciousness. Histological investigation tends to show that the intercalary neurons have no store of oxygen in their cytoplasm; they depend, therefore, upon a continuous renewal of the oxygen in the circumambient fluid; consequently, as soon as the capillary circulation ceases, they feel the effect of lack of oxygen and cease to function, causing dissociation to occur. In many of the disorders of functions and loss of functions of the central nervous system resulting from shell shock, using that term in its widest sense, there occur symptoms of cortical dissociation, e.g., cortical blindness, deafness, mutism, and paralysis.

In considering the causation of fatal shell shock without visible sign of injury, it is necessary to take into account chemical changes in the atmosphere, together with the physical forces generated by the explosive. The effect of the emanation of a poisonous gas was the explanation at first given for instantaneous death without physical sign of injury. Many authorities regard it as much more likely to be due to the effects of concussion on the nervous system. M. Arnoux, a French civil engineer, has studied this question, and has suggested another theory which is extremely interesting. A pocket aneroid barometer carried by an officer had been exposed to an explosion of the kind referred to, and was put out of working order by the force of the concussion. M. Arnoux had the aneroid repaired; he then placed it under the reservoir of an air-pump and exhaust until he had produced the same effect on the aneroid as was observed before it was repaired. He calculated from observations and experiments that the dynamic pressure exerted by the surrounding air on bodies within a few yards of the exploding shells had amounted to over 10,000 kilos per square metre. The effect on the human organism of so powerful and so sudden a decompression would be similar to that which causes the deaths of aeronauts who make too rapid an ascent, or of workers in compressed-air caissons who leave their caissons too quickly and without taking proper precautions for their slow decompression—namely, the sudden escape from the blood of bubbles of air and CO_2, which would produce capillary embolism throughout the body and sudden death. The cases that have recovered after severe shell shock very rarely show signs or symptoms of organic disease.

Myers,[2] Campbell,[3] Forsythe,[4] and Eder[5] have contributed clinical studies of the war neuroses, with detailed reports of many interesting observations. All emphasize the prime importance of **Psychotherapy** in the treatment of this group of cases, e.g., hypnotism and suggestion; and Eder has used the psycho-analytic method as well with some success.

W. A. Turner[6] gives a brief but very comprehensive account of the

manner of distribution and arrangement for the *care and after-treatment* of the psychoneuroses of war in the United Kingdom. This includes a description of the mode of development of the present large neurological centres, the manner in which cases are distributed after their reception at the base hospitals in France, also mention of the various mental and neurological hospitals.

Dejerine and Gauckler[7] review the results obtained by isolation and psychotherapy in the treatment af the psychoneuroses of war. They emphasize the importance of **Isolation** in this group of cases, and follow the well-known method of Dejerine, so long practised at the Salpetrière, by which individual isolation is obtained in hospital wards by the use of curtains around each bed. The symptomatology of their cases is similar to that described in the other *centres neurologiques*, and consists of contractures, paralyses, various attitudes, astasia, abasia, disturbances of gait, ties, chorea, tremors, anæsthesia, deaf-mutism, blindness, neurasthenic states, and mental confusion. They note the occasional absence of the plantar reflex in association with functional anæsthesia, and also the occurrence of an ankle-clonus which is not to be distinguished from the clonus of organic origin. Such pseudo-organic symptoms have been rarely observed in civil practice, and is another bond of union between the psychoneuroses of war and those of peace.

They warn against the too free use of local measures—mechanical, electrical, etc.—as tending to fix or localize the idea of disability. Many of the milder cases, it is thought, would have recovered more rapidly if kept near the 'front' under military régime, suggesting that a reflective attitude would be induced by a residence in one of the large medical centres in the rear, and this would favour a replacement of the instinct of sacrifice by the instinct of conservation.

They recognize two large groups of cases from the therapeutic standpoint: (1) The emotional type, which does well on rest, isolation, and re-education, the last-named being largely persuasive in character, consisting of sympathy, encouragement, and other gentle measures of inducement. (2) Where the symptoms are created by a mechanism of conscious subjectivity. A more severe and disciplinary treatment is here indicated, with isolation, separation from friends and relatives, and denial of little privileges and interests.

There is also introduced an element of precision in measuring the symptoms—a *méthode métrique* as it is termed—by which an improvement in the chief symptom, e.g., a flexion contracture of the forearm, is measured from day to day, and a graphic record kept in open view at the foot of the patient's bed. Any relaxation in the privations of the régime is entirely dependent upon the degree of improvement. By a little ingenuity nearly all symptoms are susceptible of some system of measurement, either of duration—*ordre durée*—or of measure —*ordre géométrique*. At the same time a severe and coercive attitude is maintained. By one of these methods many of their cases have been cured and others ameliorated.

They emphasize the importance of persistent organic symptoms, and the necessity for the careful search for such in a functional case.

References.—[1]*Lancet*, 1916, i, 331 ; [2]*Ibid.* 65 and 608 : [3]*Pract.* 1916, i, 501 ; [4]*Lancet*, 1915, ii, 1399 ; [5]*Ibid.* 1916, ii, 264 ; [6]*Ibid.* i, 1073 : [7]*Presse Méd.* 1915, 521.

PSYCHOSES, THE INFECTIVE EXHAUSTION.

Bedford Pierce, M.D., F.R.C.P.

Under this heading Sanger Brown[1] describes a mental disorder the symptoms of which fall under three heads—the organic, the affective, and the psychogenic reactions. It is usually preceded by a short prodromal stage of irritability and emotional disturbance ; it is followed by delirium lasting for weeks or months, which may pass into confusion or even stupor. The organic group of symptoms include the physical signs of disease—the fever, cardiac changes, malnutrition and wasting, and possibly signs of neuritis. With these are associated delirium, disorientation, amnesia, and possibly hallucination of several senses. The affective part of the reaction comprises the alteration in temperament, which may be depressed or expansive. The psychogenic reaction refers to the delusional content, and disorders of conduct, mannerisms, oddities, and peculiar habits which suggest mental deterioration. The symptoms generally resemble those in alcoholic insanity. The duration of the psychosis may be short, or it may last three years. The prognosis is considered good, and very few become chronic. The cases in which the psychogenic factors are most prominent must be considered as the least hopeful.

This account closely corresponds to the description of acute confusional insanity, amentia, verwirrtheit, mania with confusion, of other writers, and though no doubt some infection and some degree of exhaustion are usually present, it does not appear that these are sufficiently constant to justify the title given. A non-committal title such as 'acute confusion' seems preferable.

Reference.—[1]*Jour. Ment. and Nerv. Dis.* 1916, 518.

PSYCHOTHERAPY.

Bedford Pierce, M.D., F.R.C.P.
Marguerite Wilson, M.B., Ch.B.

The main principles of psychotherapy are stated by Abrahams[1] to fall under four heads : persuasion, suggestion, re-education, psychoanalysis.

Persuasion implies the introduction into the patient's consciousness of new ideas or the destruction of morbid ideas with the patient's full consent and understanding. It is the best form of treatment, and its results are most lasting. It demands, however, intelligence on the part of the patient and a willingness to be persuaded.

Suggestion means the introduction of new ideas without the patient's consent. Hypnosis is an aid to suggestion and assists in breaking down resistances. Hypnosis stands in the same relation to suggestion as chloroform to surgery.

Re-education involves the teaching of patients to control their mental machinery. It is frequently accompanied by isolation, overfeeding, and rest, and the isolation helps to eliminate external causes of emotion and facilitates auto-suggestion.

Psycho-analysis is cautiously treated by Abrahams. After briefly describing the methods of free association, word association, and dream interpretation, he states that "it is by no means a small objection that the things which come into the patient's mind during his psycho-analysis are by no means representative of his real thoughts in his past life, which thoughts may in the meantime have become obscured and modified out of all recognition. Further, the influence of the examining physician in directing the trend of the patient's thoughts is considerable . . . Psycho-analysis drags into the light of day the soiled clothes of the subconscious mind . . . Sometimes the soiled linen becomes so dirty that it calls out to be brought out and washed. But in the majority of cases, as a clever writer has put it, the advice of the frog doorkeeper to Alice is quite simple enough: 'You let it alone, and it'll let you alone'!"

Psycho-analysis still gives rise to bitter controversy, and it is difficult to find anywhere unbiassed opinion founded upon personal experience. One school denounces psycho-analysis and all who practise it; they speak of the serious harm it does: and sometimes their criticisms are not far removed from unreasoning abuse. The other school consider Freud as the greatest psychologist of the day, and that he opens the door to a new psychiatry of the utmost value to mankind, whilst the opposition to the new teaching is due to ignorance and prejudice. During the greater part of 1916 a correspondence has continued in the *Lancet* illustrating these divergent opinions. There is a tendency of some authors to avoid using the word psycho-analysis whilst taking full advantage of the Freudian methods of investigation. The reason for this is that the word seems to imply an acceptance of certain theories enunciated by Freud which in England are generally repudiated. In particular the extreme views in regard to infantile sexual experiences meet with little or no support in this country. Objection is also taken to the view that the neuroses and psychoneuroses are always dependent upon sexual conflicts, repressions, or inversions, and many writers on the subject take care to disclaim acceptance of Freud's theories of the influence of sex in the production of disease. It would be convenient if some other term could be devised that would denote the methods of investigation, seeing that psycho-analysis has now acquired a special meaning which cannot be dissociated from Freud's hypotheses.

Interpretation of Dreams.—The importance of the study of dreams in elucidating the source of mental symptoms is now generally recognized. Terrifying dreams, during which incidents of battle are rehearsed, are one of the most constant symptoms of shell shock (*q.v.*, p. 464). More commonly dreams are so unlike any previous experience that it is difficult to trace connection between the dream and the 'stuff'

from which it is made. According to Freud, it is assumed that during sleep the censor which in the waking state exercises powers of selection over the thoughts that enter consciousness is also asleep, or at any rate less active, or that dreams express aspirations, desires, conflicts, and dislikes which otherwise would be repressed. They tend, however, to be expressed in strange symbolic forms, so that it requires much experience to unravel the hidden meaning of the dream. It is here the personal equation comes in, and to an increasing extent exception is taken to the forced and arbitrary meanings that are assigned to dreams. The danger is obvious, for the interpreter may find what is in accord with his preconceived opinions. Few unbiassed students could read Maeder's article on the dream problem without profound dissatisfaction, if not disgust.[2] Psycho-analysis is surely here at its worst. Symbolisms are quoted with approval which are far-fetched and repulsive, whilst the conclusions reached are ridiculous. The divergences of opinion between Freud and his pupil are unedifying; yet the article should be read by students of the subject as showing the dangers of ready-made clues to the interpretation of dreams.

Morton[3] reviews the modern theories of dream interpretation, and to illustrate his views quotes a dream, giving an interpretation according to Freud, in which sexual repression plays an important part; next another according to Jung, whom he quotes, "One has only to hear this dream material in order to understand at once that the dream is not so much the fulfilment of infantile desires as it is the expression of biological duties hitherto neglected because of . . . infantilism," so that the dream really arises from a conscious lack of professional success. Morton describes what he calls the reconstitutive method, which brings into relief a process of trial and error characteristic of dreaming. He claims that the secondary images which form the manifest content of the dream can be traced by logical association to the original stimulus, whether this be physical or psychical. He warns the psycho-analyst against relying upon the authority of his leaders, and says that the subject is "full of pitfalls to common sense."

The opinion is expressed by Fraser[1] that many dream images are due to the emotion of fear, and not to sexual memories or conflicts. Referring to a case he says, "No doubt the Freudian psycho-analysis would be able to carry her memory back into the region of long-forgotten infantile or early sex memories, where in every normal being they lie, the shadowy outlines of instinctive feelings whose roots are in a far-away phylogenetic past, having apart from suggestion no rôle as factors in the production of morbid fears or fancies. The fantastical and too often repulsive dream interpretations of this school forcibly remind us of the words of Lord Bacon, 'With regard to the interpretation of natural dreams, it is a thing that has been laboriously handled by many writers, but it is full of follies.' All kinds of trivial incidents of childhood and early youth are stored up by all of us, and are recollected in sudden and unexpected ways, but not because of

any relaxati n of a supposed 'censor,' nor necessarily because of any content of a sex nature, but because they are more often than not associated with fear, chief of the coarser emotions, and a more primitive or enduring emotion than any connected with reproduction, and more alien to the organism than sex memories of even a perverse order."

Armstrong-Jones[5] also criticizes adversely the modern methods of interpreting dreams. He protests against the ready-made array of symbols used in interpretation, and in particular takes exception to the assumption that sexual conflicts play a predominant part in dreaming. "This sexual theory is over-emphasized, and the Freudians who urge sex as the basic origin of all dreams, of all obsessions, and of all longings, impulses, and neuroses, are 'sex-intoxicated,' for in life's reality there are other primary and original instincts as well as sex, of which fear, anger, and hunger are the most common examples. All these run deep in the unconscious mind, and each has suffered far more repression than sex. It is against human experience that all dreams are desires, and it is repulsive that all dreams should be interpreted as relating to sex, and such an explanation has brought these conclusions of what have been called 'chimney-sweeping' investigations into deserved disrepute."

In spite of this destructive criticism, we can agree with Armstrong-Jones that it is well that attention has been drawn to this subject afresh. It is reasonable to conclude that dreams are not haphazard phenomena of no significance, but that they throw unexpected light upon past experiences and, rightly investigated will help us to ascertain the mental stresses and troubles of our patients. Whilst fully admitting that the sexual theory is greatly overdone, and that the conception of a 'censor' only confuses the issue, there probably remains much in the Freudian theory which will prove of value in assisting in the elucidation of psychical problems.

Multiple Personality.—An interesting case of quintuple personality has been published by Walter F. Prince.[6] For three years he made a daily study of the complex alterations in the personality of Doris Fischer, who was twenty-two years of age when first seen. The first mental dissociation occurred suddenly when three years of age, and was due to ill-treatment by her father. At this time two subsidiary personalities appeared, and a fourth at the age of seventeen, the time her mother died. A year later, after a fall on her head, a fifth shadowy personality appeared. For many years the primary personality of Doris called the 'real Doris' could not be said to have any continuous existence. After a few minutes, one or other of the secondary personalities would obtrude, and they changed about in a capricious way when fatigued. The real Doris was an attractive young woman of sterling integrity, but one of the secondary characters was an impish, mischievous child who never developed, and who became more childish as recovery progressed. Another was a dull, unimaginative person, troubled with nervous pains and aches, who did beautiful

needlework, whilst a third seemed to be intelligent and thoughtful, and only appeared when the childish personality had gone to sleep. The latter possessed a knowledge of the doings of all the others, but none of the others knew of its existence except by inference. The case presented no unpleasant features of any kind, although until received in the doctor's house the home life had been unhappy and poverty-stricken.

Examination of the field of vision and of general sensation disclosed deficiencies in the various personalities, and as recovery progressed, the primary personality gained what they lost.

Gradually, by re-education and suggestion, the subordinate personalities dwindled and appeared less frequently. In April, 1914, they finally disappeared, and since then there has been no break in the continuity of the consciousness of the primary personality. The real Doris absorbed all the others. This was in striking contrast to the condition before investigation, when for five years she had not had three consecutive days of continuous existence.

The changes from one phase to another were usually accompanied by visible signs, such as a jerk or sudden movement of the whole body, which was most marked when the change was from the lower to the higher. Prince suggests that fatigue had much to do with the changes; it seemed as if a personality retired in order to gain strength for a fresh manifestation. On recovery, the patient was found to be bright and intelligent, full of interest in life, and altogether free from the physical ills that troubled one of the secondary personalities. Photographs of the various phases are reproduced, and the case will in due course be published in full. It is of considerable interest as throwing light upon the sudden changes of mood in many mental cases; and without accepting Prince's clear-cut subdivisions, it illustrates the possibility of the synthesis of a mind which has become seriously dissociated.

References.—[1]*St. Bart.'s Hosp. Jour.* 1916, April, 79; [2]*Jour. Ment. and Nerv. Dis.* 1916, 81; [3]*Jour. Abnorm. Psych.* 1916, 369; [4]*Ibid.* 400; [5]*St. Bart.'s Hosp. Jour.* 1916, Aug., 141; [6]*Jour. Abnorm. Psych.* 1916, 73.

PURPURA HÆMORRHAGICA. *Herbert French, M.D., F.R.C.P.*

The use of blood transfusion in the treatment of various blood states is familiar, but its difficulties are many. Emsheimer[1] draws attention anew to a most useful alternative suggestion which involves no technique that cannot be carried out easily in ordinary practice. This is the use of **Intramuscular Injections** of whole fresh human blood. The case in which he used this method is recorded by him in full. Briefly, it was a condition of severe purpura hæmorrhagica with hæmaturia in a boy, age 5. The condition was going from bad to worse. There was no time to resort to transfusion of blood; it was decided, therefore, to employ fresh whole human blood and to give it by intramuscular injection.

Twenty c.c. of blood were withdrawn by means of a 'Record'

syringe (lubricated with sterile petrolatum) from the median cephalic vein of a relative whose Wassermann test was known to be negative, and were immediately injected into the gluteal region of the patient. Because of the possibility of clotting within the syringe, the time-saving element became an important factor in the technique; a second needle had been previously inserted into the tissues of the patient; therefore it was necessary merely to discard the needle used in the withdrawal of blood from the donor, connect the blood-containing syringe with the needle in the tissues of the recipient, and inject. There was not the slightest evidence of clotting in the syringe after this procedure.

There were no untoward effects, either local or constitutional, as a result of the treatment. About twelve hours after the injection, the urine, which for seven days had been dark brown, almost black at times, became much lighter in colour. Four hours later, that is, sixteen hours after the injection, the child voided urine which, to the eye, was perfectly clear, and which even microscopically contained only a few red blood-cells. During the remainder of that day the urine voided was again smoky, but was much lighter than before the injection. On the following day several clear specimens were voided. From that time improvement became more and more marked, until at the end of ten days from the date of injection no specimen voided at any time during the day contained even microscopic blood. The improvement in the skin condition, although less striking, was just as steady and as marked. An occasional new crop of petechiæ or a fresh ecchymotic spot would appear; but the great majority gradually faded. Attempts to walk or to allow the legs to hang down for any length of time would occasionally produce fresh hæmorrhages; but this tendency also gradually disappeared, so that six weeks after the onset of the disease, the patient having had no further blood injections, all evidence of the hæmorrhagic diathesis had entirely disappeared.

REFERENCE.—[1]*Jour. Amer. Med. Assoc.* 1916, i. 20.

PYELITIS OF PREGNANCY. (*See* PREGNANCY.)

PYELOCYSTITIS IN CHILDREN. *Frederick Langmead, M.D., F.R.C.P.*

S. Cannata and G. Caronia[1] believe that infection from the blood-stream is the most frequent and important cause. They found the condition to be common in the children's clinics at Palermo and Naples, especially among girl infants in the hot weather. Two forms were distinguished—primary and secondary. In the primary cases there is usually fever, accompanied in some cases by inconstant general symptoms and pallor. At the same time polyuria, painful micturition, and turbidity of urine also make their appearance. Secondary pyelocystitis aggravates the symptoms and general ill-health of patients suffering from the initial disease. The fever is enhanced, and disturbances of micturition are added.

The fever assumes various forms, the irregular intermittent form predominating. Pallor is a marked feature, and may outlast the affection. Among urinary symptoms dysuria from spasm of the vesical sphincter is frequent, polyuria and sometimes enuresis and hæmaturia occur, but retention is rare. Anorexia and vomiting are met with; diarrhœa is more common than constipation. They have noted enlargement of the liver, with or without jaundice and enlargement of the spleen. The respiratory system may be affected before the onset of urinary symptoms, but the circulatory system usually escapes, although polynucleosis and sudanophilia may be found. The nervous system shows more or less severe symptoms of reaction.

Diagnosis depends upon examination of the urine; prognosis must be guarded, since the disorder may become chronic.

Treatment.—These authors put little faith in alkalies, but prefer **Salol** and **Hexamine.** In their opinion **Serum** and **Vaccine** treatment play an important part.

Huet[2] discusses the medicinal treatment, and finds that the effects of drugs on different kinds of bacteria in a test tube do not correspond with those experienced clinically. Experimenting with hexamine, potassium citrate, sodium citrate, and salol, he found that the last-named was only beneficial in one case. The **Citrate** appeared more generally useful. It was evident that the effects of the drugs varied with the dosage, the acidity of the urine, and still other factors with each case.

He also inclines to the view that the infection is from the blood, instancing the fact that Czerny and Moser have found the *B. lactis aerogenes* and the colon bacillus in the blood-stream under such conditions. He records a small but interesting epidemic. Five infants were affected, the first one or two weeks before the others. The children were in different apartments, and the infection could only have been conveyed by the night nurse. The question whether the infection occurred by way of the urethra during changing of the diapers, or by the feeds, seemed to be answered in the case of one infant by an inability to find organisms in the urine until the symptoms of pyelitis had been present for nearly six days. Bacteriological examination confirmed the specificity of the infection in these cases, a paracolon bacillus with identical characters being found in each.

His conclusions as to treatment are, that drugs used to disinfect the renal pelvis are scarcely likely to reach the bacteria within its walls, but that they play an important part in combating the infection in the urine, and therefore such urinary antiseptics are necessary in every acute case. Potassium citrate he considers chiefly efficacious by its effect on osmosis, causing lymph to pour out and carry with it the bacteria, thus bringing them within reach of other therapeutic means,

References.—[1]*Pediatria*, 1914, xxii, 561, 646; [2]*Jour. Amer. Med. Assoc.* 1916, i, 893.

PYELOGRAPHY. (*See* Kidney, Surgery of: *X*-ray Diagnosis.)

PYLORUS, CONGENITAL STENOSIS OF.

Frederick Langmead, M.D., F.R.C.P.

The existence of pyloric spasm as a condition distinct from hypertrophic stenosis is not generally acknowledged. Those who believe that the two terms denote one and the same condition have gained support from recent articles. Thus, as E. Mather Sill[1] remarks, those who have had under their care many cases of pyloric obstruction have seen three different grades of severity, namely, cases with pyloric spasm predominating, cases of combined pyloric spasm and some hypertrophy, and cases of spasm and marked hypertrophy and stenosis of the orifice. A. A. Strauss[2] classifies the various cases met with somewhat differently, into those with complete and those with partial obstruction, and subdivides each group according as to whether the degree of hypertrophy is great or little. In the experience of Sill a tumour of the pylorus can rarely be felt. Downes,[3] on the other hand, states that a palpable tumour, varying in size from the terminal phalanx of a little finger to that of a thumb, is invariably present. To demonstrate it he finds it necessary, however, when abdominal palpation is difficult, to use slight anæsthesia after the stomach has been emptied of gas by the tube. Sill considers the visible gastric peristalsis sufficiently diagnostic.

Etiology.—Whether the spasm of the pylorus or the hypertrophy of the musculature is primary is still a disputed point, though it seems to be agreed that both are present in a developed case. Strauss holds that the hypertrophy cannot be secondary to spasm, for if it were, the overgrowth would be greatest in the position of greatest muscular activity, namely, the wall of the pyloric antrum. Together with Abt, he has been performing experiments on a series of young dogs, and has found that although he induced spasm and hypermotility of the stomach, no muscular hypertrophy resulted.

Treatment.—Sill writes of the importance of keeping the infant on breast milk, either that of the mother or of a wet nurse. This is the general opinion, although certain authors have considered that the mother's milk is deleterious in these cases. W. A Downes reports a series of 66 cases operated upon by himself; of these, 31 were treated by gastro-enterostomy and 35 by pyloroplasty. The form of **Pyloroplasty** employed was the method devised by Rammstedt, which consists in dividing the tumour down to the mucous membrane without making any attempt to sew up the gap vertically. When this has been done, the mucous membrane pouts into the wound. The bleeding is said to be very slight and easily controlled. The stomach is then dropped back into the abdomen. Of the 31 cases treated by gastro-enterostomy, 11 died, whilst of the 35 treated by Rammstedt's operation, only 8 died.

A very ingenious new operation has been devised by Strauss. He incises the pyloric tumour in its upper and anterior quadrant by a longitudinal incision for the whole of its length and slightly beyond it at each end, carrying the incision down to the mucosa. He then

PLATE XL.

CONGENITAL STENOSIS OF THE PYLORUS.—A. A. STRAUSS'S OPERATION

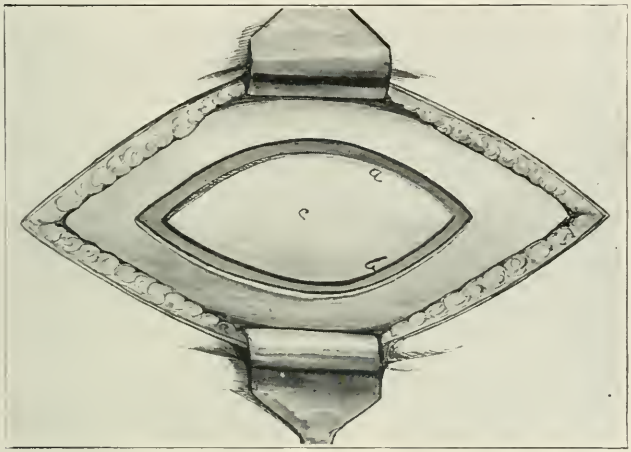

Fig. 1.—Incisions: *a*, first incision; *b*, second incision; *c*, sheath of rectus (anterior).

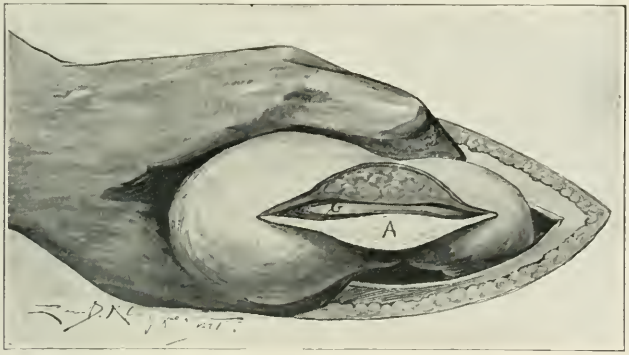

Fig. 2.—*A*, muscle tumour; *b*, the mucosa.

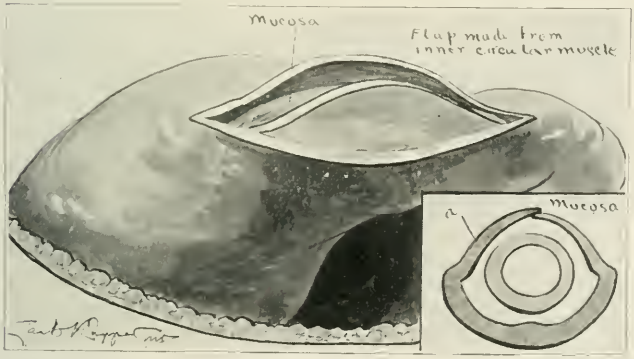

Fig. 3.—Muscular flaps turned out; inset, transverse section: *a*, muscularis.

CONGENITAL STENOSIS OF THE PYLORUS—*continued*

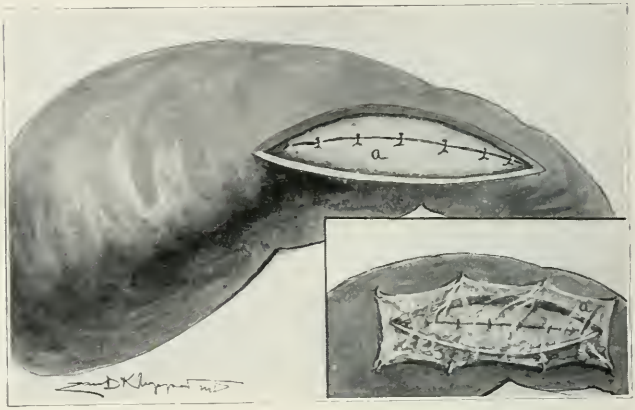

Fig. 4.—The newly-made muscle flap sutured; inset, *a*, free transplant of great omentum covering field of operation.

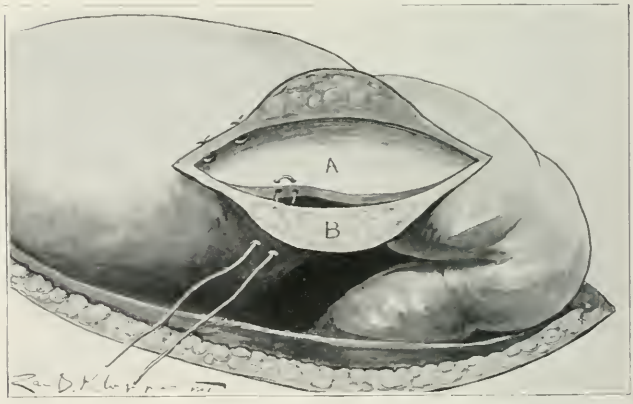

Fig. 5.—*A*, fascial transplant from anterior sheath of rectus; *B*, muscle tumour.

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separates off the mucous tube from the tumour without dividing the mucous membrane. This, he says, is an easy procedure. The muscle 'tumour' is then divided longitudinally into two layers of equal thickness, a deep and a superficial, and the incision thus made is carried laterally almost to the edges of the original incision. This newly-made flap is then everted. Finally, a small piece of free transplant from the great omentum is sutured over the pylorus to cover the raw surface.

When the muscle hypertrophy is inconsiderable he advises a modification of this operation, which consists in implanting a free piece of the rectus sheath between the edges of the divided tumour instead of making the flaps described. *Plates XL, XLI*, illustrate these operations. He records four cases treated by the first of these methods, with recovery in all. The second he has as yet only employed experimentally. The advantages which he claims for these procedures are : (1) That the abdominal incision required is small as compared with that for gastro-enterostomy ; (2) That this prevents a great deal of shock ; (3) That the methods cover every form of the condition ; (4) That a normal pylorus is constructed, particularly as to its lumen and the thickness of its musculature ; (5) That, as the food passes still through the pylorus, the normal reflexes between the stomach and developing liver and pancreas are maintained ; (6) The time taken need not be more than ten minutes, and the children come back from the operating-theatre with no more shock than after the smallest minor operation

References.—[1]*N.Y. Med. Jour.* 1916, i, 775 ; [2]*Jour. Amer. Med. Assoc.* 1915, ii, 1533 ; [3]*Surg. Gyn. and Obst.* 1916, i, 392.

PYORRHŒA ALVEOLARIS. (*See also* Stomatitis, Ulcerative.)

W. H. Dolamore, M.R.C.S., L.D.S.

This term, commonly used, is open to many objections. A discharge of pus is symptomatic of several distinct clinical conditions ; whilst if these conditions are held to be but variants of one pathological state having a like cause, then the name does not indicate this. Many other names have been suggested. Colyer[1] adopts 'chronic general periodontitis.' In this all conditions, of whatever origin, in which the morbid condition of the tissues is similar, are included, but clinical states are ignored, except by use of the word 'chronic.' Apart from the difficulty of drawing a sharp distinction between acute and chronic conditions, there is the fact that the clinical history of what is known as Rigg's disease, to which the term 'pyorrhœa alveolaris' is limited by many, differs essentially from periodontitis due to dirt, including accumulations of tartar ; to the presence of septic roots, whether with or without their natural crowns ; and to the condition in old people when, in consequence of senile atrophy of the alveolus, chronic periodontitis is caused by the constant movement of the 'long' teeth and by the impossibility of keeping these clean. It is true that two distinct diseases, if they be distinct,

may exist coincidently; but many desire, if the term 'pyorrhœa' be used, to limit it to a disease beginning in the gum margins, and frequently around teeth which are clean.

These margins become red and swollen, especially in the interdental spaces. If the gums be pressed upon with the finger, drawing it towards the margin, drops of blood will be expelled. Frequently in this stage the patient complains of the gums bleeding. A little later, distinct pockets have formed around the teeth, out of which pus and blood can be expressed. The compact layer covering the bony socket has disappeared, the margins of the socket are being absorbed, and the substance of the alveolus is becoming rarefied. The gum may be pale and shrunken, or red and swollen. As the bone disappears, so the pocket deepens and the discharge of pus increases. The pericementum is destroyed, and, around and adherent to the roots of the tooth, rings and fragments of tartar are formed. Sometimes only one or two teeth are affected, sometimes many, but not necessarily contiguous ones. Often the disease is more advanced in one part of the mouth, around one or more teeth, than at another. Frequently the disease shows exacerbations; a tooth may become markedly loose and tender; then the pain lessens and the tooth tightens. Sometimes abscesses form which burst into the peridental pockets, or are opened and subside. Pain is infrequent and tenderness remarkably absent. The breath has a sickly odour, and the constitutional effect, apart from specific lesions, is shown by the dirty tongue and by the muddy appearance of the skin. Eventually the teeth are lost; sometimes they drop out almost painlessly; at other times a tooth is twisted sideways when biting, a little of the remaining periodontal tissue is torn, inflames, aches, and the tooth has to be removed. When the teeth are removed, the wounds heal normally.

Such characteristic lesions suggest a specific cause, but none has been identified. A local injury of the gum margin is the possible seat of the initial inoculation, as Colyer shows by analogy with a similar condition present in horses fed on chaff; but, per contra, it is admitted that if teeth articulate normally, a hard coarse diet promotes the healthiness of the sockets and of the gum, and in such cases pyorrhœa is rare. In 1914 Smith and Barrett claimed to prove that *Endamœba*, (or *Entamœba*) *buccalis* was the specific cause of this disease. This organism, Chiavaro[2] says, was found by Prowazek in 1904 in carious teeth, and by Leyden and Lowenthal in 1915 in the detritus of a carcinoma. It is probably identical with the *Amœba gingivalis* of Gross (1849), with the *Entamœba buccalis* of Steinberg (1862), the *Amœba dentalis* of Grassi (1879), and the amœba found by Flexner in a mandibular abscess (1892). Chiavaro, working in the laboratory of Prof. Grassi, of Rome, claims to have proved that this protozoon is an independent organism, and is not a stage of development of the entamœbæ found as intestinal parasites. The various opinions held with regard to this organism are put by Williams, Sholly, Rosenberg, and Mann in a joint paper,[3] describing their investigations of amœbic

infections in the mouths of children, as follows: (1) Amœbæ are accidental invaders and non-pathogenic (Prowazek, Hartman, etc.). (2) They are non-pathogenic; on the contrary, they assist auto-disinfection (Chiavaro). (3) Amœbæ may be sometimes pathogenic, producing, or helping to produce, pyorrhœa alveolaris, certain abscesses, and other mouth infections (Leidy, Gross, Flexner, Smith and Barrett, etc.). (4) Amœbæ are the specific cause of pyorrhœa alveolaris (Bass and Johns, etc.); (5) Amœbæ may be pathogenic only in connection with certain other micro-organisms.

It is admitted that the amœbæ are found in dirty mouths in which pyorrhœa alveolaris is not present, but that they are found in greater numbers when it is; this may be due to the presence of the pockets around the teeth. The chief, indeed the only conclusive, argument in favour of their being the specific cause of pyorrhœa is the effect upon the local condition when these organisms are killed by the hypodermic injection of **Emetine.** The evidence presented by Bass and Johns[4] is not conclusive. Emetine is also used to syringe out the pus pockets:—

℞ Emetinæ Hydrochlor. gr. $\frac{1}{2}$ Aq. Oj
Sod. Chlor. $\overline{3}$j

and it seems equally to kill the amœbæ. The position, briefly, is that if these amœbæ are the cause of the disease, and as they are killed by the use of emetine, then the cure of the pyorrhœa—at least in its early stages—should be certain. This is not the case. It is stated that these amœbæ are conveyed from one patient to another, and many directions are given to prevent this. But it is a matter of common observation that of two people in close contact, such as husband and wife, the one may have pyorrhœa and the other not. This was noted and recorded by that careful observer, the late W. D. Miller. One fact stands out clearly: when the bone and the pericementum are destroyed, they are never re-formed. Hence the importance of early recognition and treatment.

Chronic periodontitis, whatever be its origin, but especially when the diseased area is large, is a factor in the production of other diseases. These may be caused by the passage of the purulent discharge into the stomach, by the passage of toxins into the circulatory system, or, possibly, be the precedent lesion which enables organisms to find ingress to the blood-vessels. Of the first, there is evidence in cases of gastritis cured by the removal of oral sepsis and *before* any attempt is made to assist mastication by mechanical aids. The second is shown by the occurrence of cases of hyperpyrexia ceasing when the roots and septic teeth are removed. Thus the writer saw a patient whose temperature chart showed diurnal variation from subnormal to 104°, continued over several weeks, during which the mastoid cells were re-opened, after having been previously operated on, but without effect and without a lesion being found. Her previous history was one of continuous ill-health for a long period, in and out of hospitals and infirmaries. A few days after, her mouth was clean and her temperature

normal, and she afterwards remained well. Further evidence is the clearing up of the muddy complexion. The third group of cases is perhaps best seen in ocular lesions—iritis, choroiditis, etc.—some commencing suddenly and coincidently with oral suppuration and subsiding when it is removed. Evidence has accumulated to prove the connection between oral sepsis and rheumatoid arthritis and rheumatism, whilst Hunter has for years maintained that it stands in some causal relationship to pernicious anæmia and endocarditis.

Treatment.—When general chronic periodontitis is due to septic roots, or seen in old people as the result of alveolar atrophy, the **Teeth should be Removed.** In old people it is especially advisable that this should not be postponed till the patient is too feeble. If this be done, the patient may fail to benefit and may possibly die, and the extractions will certainly be credited with having hastened the end. With regard to roots which can be rendered of service and more or less sterile, the question arises—should they be left? Certainly, if useless, they should be removed; if of use, it must be admitted that their life is limited, whatever superstructure be placed upon them. If the periodontal tissues are septic, they are rarely rendered aseptic. No new treatment of pyorrhœa has recently been proved. The tendency has been towards relying on local treatment for ordinary cases, associated with **Vaccines** when some constitutional condition is associated, and possibly connected, with the local condition. The first essential in local treatment is thorough and frequent **Removal of Tartar.** The second is the continuous **Removal of Septic Discharge** from the pocket. This can only be obtained by obliterating the pockets and by the patients themselves cleansing these several times a day. The former is done by trimming away the gum with a knife, or by taking out V-shaped pieces, allowing the tissues to contract and scar. Even when the superfluous edge can be trimmed away, vertical incisions should be made, to allow drainage. The result is not attained for several weeks, and the treatment may need to be repeated; but in time it is possible to obtain complete retraction of the gum and obliteration of the pocket, a firm, thick vascular edge being left. The pockets are best washed out by syringing frequently with **Peroxide of Hydrogen**, though some prefer swabbing with **Tincture of Iodine** (2 per cent). In this treatment one looks to the reactionary hyperæmia—which may be encouraged by gum massage and suction—to cause the disappearance of the micro-organisms in the tissues; but some prefer to endeavour to kill these in situ by **Ionization.** Seeing that no bone re-forms, treatment is useless unless sufficient remains to continue to hold the teeth firmly in place. If very slight cases be excepted, no treatment so far has been proved to do more than check the progress of the disease. This in itself may prove well worth while, but must be undertaken with due consideration of any coincident disease. To attempt to save the septic teeth when rheumatoid arthritis may make a patient bedridden, or ocular lesions threaten blindness, is to "fiddle while Rome burns."

Wright[5] claims to have cured cases of pyorrhœa and associated lesions, including a case of pulmonary tuberculosis in the last stage, by use of intramuscular injections of **Mercuric Succinimide.** For the male, 1 gr. is used, dissolved in 20 min. of hot sterile distilled water, and one-fifth to two-fifths less is used for the female. The injections were made in the buttock, repeated every seven days; average number of injections 2·9. Local treatment was applied to gums and teeth; bridges, etc., were removed. Wright claims that mercury has considerable affinity for all vegetable parasites and destroys them.

References.—[1]*Chronic General Periodontitis* (Claudius Ash & Sons, 1916); [2]*Ann. di Odontol.* (*Dent. Rec.* 1916, 626; [3]*Jour. Amer. Med. Assoc.* 1915, ii, 2070; [4]*Alveolodental Pyorrhœa* (W. B. Saunders & Co., 1915); [5]*Med. Rec.* 1916, No. 19.

RECTUM, SURGERY OF. *W. I. de C. Wheeler, F.R.C.S.I.*

Hæmorrhoids.—The treatment by **Injection** has been revived, and the published results from the writings of various authorities encourage the belief that the method deserves careful attention and further trial. It is advocated by Bird.[1] The treatment requires no anæsthetic no internment in hospital, and is accompanied by very little pain.

Morley[2] emphasizes these points. For each internal pile he uses an injection of a few drops of **Carbolic Acid** and **Glycerin.** The solution he recommends is carbolic acid 46 gr., glycerin 2 dr., distilled water 2 dr. This is a 20 per cent solution of carbolic acid: 2 to 6 minims should be injected, great care being taken not to inject too much, as it may cause pain. All the piles may be injected at one sitting when practicable, and the operation should be performed through a large speculum. The syringe should be such as can be easily used through the speculum. The one he finds most useful is known as Dawson's dental syringe, but the needles have to be specially made. It is provided with two rings at its base to act as a finger-grip. Being made of metal it is easily sterilized. A good head-light is necessary. The patient should be placed either in the knee-elbow position, or on the left side with a sand-bag under the hip. The speculum, well lubricated, is first passed to its full length; it is then slowly withdrawn for about an inch at a time, and pressed in again for half an inch. In this way the hæmorrhoids are made to prolapse into the lumen of the speculum. The greatest care must be taken not to inject as low as the mucocutaneous junction, in order to avoid after-pain.

The needle should be inserted in the long axis of the pile to near its base. The lowest pile is dealt with first. The whole proceeding takes two or three minutes. Immediately after treatment the piles have a tendency to prolapse more than before, and should be at once gently reduced to prevent the risk of strangulation and sloughing, and the patient should remain in bed for twenty-four hours. Occasionally, when the piles are large, four or five injections at weekly intervals may be required. Morley makes an important point when he states that in numerous cases of inveterate pruritus, a few small hæmorrhoids

are found with the speculum, and after injection the pruritus disappeared.

Lockhart Mummery records a case in which he unwittingly injected piles in a hæmophiliac, and rather dangerous hæmorrhage occurred. This must be a very rare complication, and seems to be the only contra-indication to injection.

Swinford Edwards[3] also recommends the treatment of piles by injection. He prefers that the piles should be extruded before injecting them. The easiest cases to deal with are the uncomplicated reducible internal hæmorrhoids, which are easily extruded from the rectum. (For a special article on the treatment of hæmorrhoids by injection, see MEDICAL ANNUAL, 1916, p. 298.)

War Injuries.—Mummery,[4] writing on rectal injuries in war, says the results in many cases are very crippling. The size of the wounds and the violent suppuration result in fearful cicatrization, which causes serious stricture and contraction of the parts, more particularly if the anus is involved. Often a colotomy, permanent or temporary, is the treatment of choice. No attempt should be made to close wounds of the rectum while there is sepsis. Mummery believes that final closure can be successfully accomplished if enough of the anal musculature has been left to secure a functional result. In two cases of bleeding from the rectum after a fall injuring the region of the left iliac fossa, Mummery concluded, after a negative examination with a sigmoidoscope, that in one case the mucous membrane of the sigmoid had been injured from the fall; and in the other it was discovered that the patient was deliberately injuring himself with his finger-nail in order to remain on the sick list.

Prolapsus Ani.—Hill[5] describes a simple operation, which he performs with local anæsthesia by the infiltration method. [The writer has found that anæsthesia of all the anal region and perineum can be satisfactorily produced by introducing a needle into the sacral canal in the interval between the sacral cornua. The position for the introduction of the needle can be easily felt on the surface above the junction of the coccyx and sacrum. A needle 3 in. long is passed upwards until its point is stopped by the curve of the sacrum; an injection of 25 c.c. of a 2 per cent solution of novocain renders the parts anæsthetic in a few minutes.—W. I. de C. W.]. The prolapsed mass, if not already protruded, is brought down by digital examination. The fold of mucous membrane is pulled upon by forceps, and an incision made with scissors at the mucocutaneous junction about a quarter of an inch deep. Three curved needles, threaded with linen thread three feet long, are introduced in the manner illustrated (*Fig.* 106). The middle needle is passed first in the centre. When the ligatures are tied, the entire fold is completely strangulated, and the mucous membrane below the ligatures is excised. When the prolapse is bilateral, the same procedure is carried out on the other side.

Pruritus Ani.—Ivor Back[6] thinks that most cases of pruritus ani are associated with hæmorrhoids, fistula, fissure, etc., and the primary

condition must be dealt with to promote a cure. In some cases, however, rectal examination reveals no local cause, the pruritus being probably due to a local inco-ordination of vasomotor control. Back believes that Ball's operation cures the pruritus by interfering with the vascular and not with the nervous mechanism of the anal region. He therefore, when operating by Ball's method, cuts the inferior hæmorrhoidal artery, and with it the small branches from the sympathetic system, thus relieving the vasomotor inco-ordination of the part. The little artery is divided by cutting frankly down into the tissues of the ischiorectal fossa. The sprouting ends are readily recognized and ligatured.

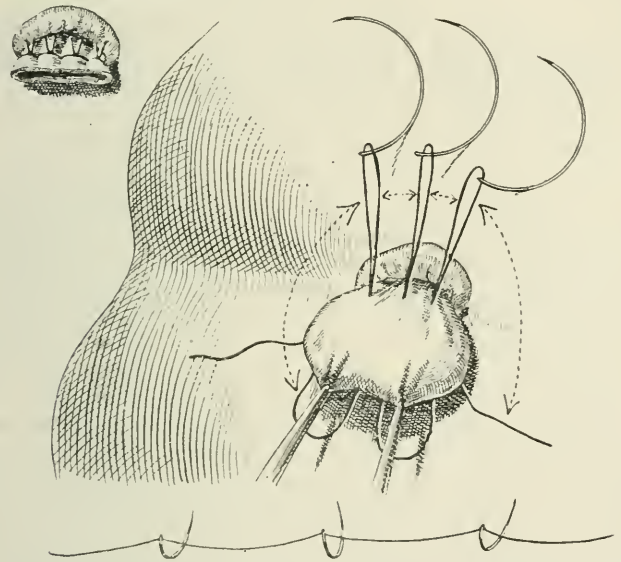

Fig. 106.—Chittenden Hill's operation for prolapsus ani. Illustrates how needles are passed through fold of mucous membrane, and dotted lines with arrow-points indicate the loops to be tied together. Three needles threaded on linen ligature, three feet long. Small illustration shows ligature tied and prolapse amputated.
(*Redrawn from the 'Boston Medical and Surgical Journal.'*)

Drueck[7] advises gradual dilatation of the sphincter by frequent moderate stretchings, carried out without an anæsthetic. The dilatation relieves the hyperæsthesia of the anal mucous membrane and, by overcoming the resistance of the hypertrophied sphincter, the constipation and tenesmus. Unless the underlying cause is removed, astringents and ointments are not of much permanent benefit. Whilst the actual cause is being treated he recommends, for temporary relief, the use of the following, to be applied two or three times a day, after bathing the parts :—

℞ Camph. Ung. Diachyli ℥
Chloral. Hydrat. āā ℥j
M. Ft. ung.

A frequent cause is eczema, in the dry form of which tar preparations are of great benefit. The following ointment may be used :—

R	Picis Liq.	℥iv	Acid. Carbol.	♏x
	Ung. Bellad.	℥ij	Adip. Lanæ	℥ij

M. Ft. ung.

In the moist form of eczema, soothing applications, such as calomel, bismuth, boric acid, starch, or zinc oxide, may be dusted on the parts. The following ointment, applied before taking any exercise, work or walking, has been found of great service in these cases :—

R.	Thymol.	gr. ij	Ung. Zinc. Stearat.	℥iv

M. Ft. ung.

In senile or debilitated subjects, as well as for those suffering from piles, fissure, and other local conditions, for which the necessary operation is refused, considerable relief is afforded by using :—

R	Hydrarg. Subch or.	gr. xxx	Paraff. Moll.	℥j
	Menthol.	gr. x–xx		

M. Ft. ung.

Cancer.—Coffey[8] recommends the two-stage operation for removal of cancer of the rectum, and refers to Mayo, who advocates the abdomino-sacral operation in two stages instead of the abdomino-peroneal in one stage. Coffey deprecates an attempt to preserve the sphincter except in very rare instances, and recommends as ideal the abdominosacral operation in two stages, with the anus in front opening either through the rectus or near the axillary line on the side.

The simplest two-stage operation in early cases consists in the formation of the ordinary artificial anus, with removal of the rectum about three weeks later by a trans-sacral operation. After removal of the growth, the open end of the sigmoid is closed, inverted, and covered by peritoneum. When a more radical method is preferable, the abdomen is opened in the middle line. The pelvic colon is freely mobilized and divided. The proximal end is temporarily closed and brought through the abdominal muscles to form the artificial anus. The distal end of the gut is also closed. A rectal tube is passed through the anus as far as the closed distal end, and is there secured to the gut by a strong suture. The gut is now steadied by two forceps, and as an assistant pulls on the tube at the anus, inversion takes place. The operator, with the help of the assistant, manipulates the gut and the tube until the inverted distal segment appears through the anus. The colotomy is opened in two or three days, and the inverted distal segment carrying the growth is removed by trans-sacral operation three weeks later.

Burroughs[9] thinks that ether anæsthesia is unsatisfactory in operations on the rectum and anus, and leads to delays and dangers which are avoided with novocain anæsthesia. Local anæsthesia in the removal of hæmorrhoids is also advocated by Hawkins and many other authorities.

Quinine recommended as an anæsthetic after rectal operations (p. 25).

REFERENCES.—[1]*Lancet*, 1916, ii, 149; [2]*Ibid.* i, March 18; [3]*Ibid.* 1915, i, 819; [4]*Proc. Roy. Soc. Med.* 1916, June, 26; [5]*Boston Med. and Surg. Jour.* 1916, ii. 127; [6]*Pract.* 1915, ii, 667; [7]*Amer. Med.* 1916, April (quoted in *Pract.* 1916, ii, 94; [8]*Ann. Surg.* 1915, i, 446; [9]*Med. Rec.* 1915, ii, 961.

RHEUMATISM, ACUTE ARTICULAR. Treatment by intravenous injection of **Foreign Protein** (p. 25).

RHINITIS. (*See* NOSE. DISEASES OF.)

RHINOPHYMA. (*See* NOSE. DISEASES OF.)

RHINOPLASTY. (*See* NOSE. DISEASES OF.)

RICKETS. *Frederick Langmead, M.D., F.R.C.P.*

ETIOLOGY.—The old view of rickets as a disease due to a deficiency of fat or proteid steadily loses credence, the tendency being to inculpate the ductless glands. It appears experimentally that the power of tissues to combine with and fix calcium is defective, and those who regard the ductless glands at fault consider that this power emanates from them. In support of this belief are the known effect of the parathyroids on calcium metabolism, and the experimental rickets induced in animals by thymectomy. The views that the cause is a deficiency of vitamines, insufficient air and exercise, excess of carbohydrates, or abnormal intestinal fermentation, each have supporters.

Eric Pritchard[1] enunciates a new hypothesis. He regards the disease as due to *relative* excess of food beyond the requirements of the particular child. This excess, he says, may be stored up as a food reserve (i.e., as fat or glycogen) or be combusted or oxidized to the normal end-products, carbon dioxide, urea, and water. It may also be dealt with by the body by a short-circuiting of the oxidation processes and the formation of such bodies as lactic, oxalic, uric, glycuronic, diacetic, β-oxybutyric, and other organic acids, an acidosis arising in this way. This is neutralized at the expense of alkalies or basic elements derived from the floating reserves or the tissues. Consequently the reserves of carbonates in the blood are drawn upon, ammonia is extracted from protein reserves, whilst calcium, sodium, magnesium, and iron are withdrawn and withheld from important organic combinations. This, in his view, constitutes rickets. As chronic results are disintegration of the red blood-corpuscles, interference with the oxygen-combining powers of the hæmoglobin, and demineralization of the bones. The enlarged epiphyses of rickets he regards as due to an attempt on the part of the red marrow to compensate for the blood destruction. The obesity of rickets represents an attempt to store up the food excess, the sweating and dilatation of capillaries is an endeavour to get rid of the excess of H_2O produced by its complete oxidation, whilst the decalcification, anæmia,

enlargement of epiphyses, and nervous disturbances are the ultimate effects of acidosis and the efforts of the tissues to neutralize it.

Diagnosis.—Robert W. Lovett[2] has made a careful study of the radiographic appearances of between 500 and 600 cases. From a study of the plates the disease divided itself into three stages corresponding to those designated by Guérin and Monti as the stages of swelling and rarefaction, deformity and organization, healing and reparative eburnation. Some of these conditions are well shown in *Plates XLII*, *XLIII*, *XLIV*, which have been kindly lent us for the purpose.

In the first stage in milder cases, the ends of the diaphyses become frayed out instead of clear cut, and the epiphyses cast little or no shadow, whilst the centres of ossification are small or absent, and at times appear multiple. The joints are surrounded by hazy clouds, and the diaphyses, on the whole, contain less lime than normal, a deficiency most marked near the epiphyses. In the severer cases the epiphyseal appearances are similar but more marked. The atrophy of the diaphyses is severe, and there is pronounced periosteal thickening, often associated with fracture of the bones.

In the second stage the shadows of the epiphyses become more marked, the margins of their areas are ragged and irregular, and calcification is more definite at some points than at others, producing a mottled appearance. The diaphyseal ends begin to broaden, especially on the side on which the strain is greatest, producing a ledge or lip next to the epiphyseal line. The diaphyses begin to give a more definite shadow. At their epiphyseal ends are generally transverse areas of increased density, situated about a quarter or half an inch from the epiphyseal lines. At the ends of the diaphyses next to the epiphyseal lines there often appear clear transverse white lines indistinguishable from those which have been described as characteristic of infantile scurvy. They indicate an increased deposit of lime at the lower ends of the shafts. Other changes noticeable at this stage are cortical thickenings, endosteal in origin, at the concave sides of the bones, and chambering of the interior of the bones, the smooth homogeneous shadow of normal bone being replaced by an irregular streaked shadow structure.

In the third stage the epiphyses begin to resume their normal contour and density. Irregularities persist in the marginal outlines, and there is still a little mottling in the os-ification. The lipping of the diaphyses has enlarged the ends of the bones, and the consequent discrepancy in breadth between the diameters of the diaphyses near the epiphyseal lines and the epiphyses is very characteristic. The cloudy condition surrounding the joints has gradually cleared away, but the 'white line' intensifies. There is greater definition in the bone shadow throughout the shaft, and more compensatory thickening in the bone concavities.

The author contrasts these appearances with those seen in other conditions. In scurvy the outlines of the epiphyses are always

PLATE XLII.

ILLUSTRATING RICKETS.—R. W. Lovatt

Fig. A.—Knee in acute rickets, showing indistinct epiphyses and ragged diaphyseal ends, with blocking off of lower end of shaft.

Fig. B.—Second stage of rickets, showing returning ossification. Note 'white line' at ends of diaphyses described as characteristic of scurvy; chambering of lower part of femur.

PLATE XLIII.

ILLUSTRATING RICKETS *continued*

Fig. C.—Third stage of rickets: clear and ossified epiphyses, curved bones with compensatory thickening on concave side of curve, broadened ends of shaft at epiphyseal line, increased density of bone.

Fig. D.—Side view of anterior tibial curve due to syphilis; thickening is on convex side of curve.

PLATE XLIV

ILLUSTRATING RICKETS *continued*

Fig. E.—Side view of leg bones in congenital syphilis, showing periosteal thickening, but distinct epiphyses. (*After Fraenkel.*)

Fig. F. Scurvy, showing bone atrophy, 'white line' and periosteal disturbances in shaft, but no trouble in epiphyseal regions.

Illustrations kindly lent by 'The Journal of the American Medical Association'

distinct, and the atrophy, even though extreme, is uniform. In achondroplasia the epiphyses are also distinct and regular, and although the ends of the diaphyses are broadened, they do not show the changes of rickets. In osteogenesis imperfecta the shadow of the bones is less dense than normal, but there are no epiphyseal abnormalities or disturbance in ossification in the shafts or at their ends. The appearances in congenital syphilis most nearly resemble those of rickets. The outlines of the epiphyses are clear, however. The ends of the diaphyses in syphilitic osteochondritis and in rickets are similar, but in the former there is absence of the cloudiness of the epiphyses and of the joint. Severe periosteal thickening may occur in either, but in rickets it shows no tendency to bone-formation. In the later stages of both diseases there is cortical thickening, but in rickets it is endosteal in origin and situated in the concavity of the bones; in syphilis it is periosteal or osteoperiosteal, and situated either on the convexity or in both positions.

Late Rickets.—A. B. Marfan[3] points out the need for drawing a distinction between ordinary protracted rickets and genuine 'late' rickets. The latter may begin between the ages of eight and eighteen years. The bony changes resemble those of ordinary rickets, except that the skull usually escapes. Pains in the legs are frequent and severe, and paresis is common. In a post-mortem on a patient in whom the disease appeared at the age of sixteen, he found that the bone-marrow consisted in parts solely of blood- and lymph-cells, and in others of fibrous tissue. The skiagrams resembled those of ordinary rickets. Hutinel's form of osteomuscular dystrophy with dwarfism presents the ordinary rachitic deformities, except that the face, skull, and teeth are not affected. Paraplegia accompanied by amyotrophy, and without changes in the reflexes or electrical reactions, is always present. The subjects of this variety of rickets are dwarfs, often adipose, and show arrested genital development. It may affect several members of the same family. Osteomalacia may be distinguished from late rickets by these features: It is a general decalcification of bone, not a local one in the region of the epiphyses: it does not enlarge the epiphyses or affect the ribs; pain, paresis, and deformity are more marked; it is fatal. Among the varieties of tardy rickets he recognizes a form with asymmetrical deformity such as scoliosis, genu valgum, and flat foot. This form, he considers, usually follows slight rickets in infancy. Among the rarer forms of tardy rickets are lordosis, often accompanied by albuminuria, swelling of the inner extremity of the clavicles with subluxation of the sternoclavicular articulation, and curving inwards and forwards of the lower end of the radius, producing difficulty in extension of the wrist. With tardy rickets Marfan associates physical and intellectual torpor, hyperplasia of lymphoid organs, and atony of both smooth and striped muscle. Among the symptoms are cyanosis of the extremities, headache, and intermittent albuminuria. In Marfan's opinion, tardy rickets is due to chronic infections such as syphilis and

tuberculosis, and may appear after febrile diseases such as scarlet fever, varicella, bronchopneumonia, and osteomyelitis.

TREATMENT.—In addition to the usual dietetic and hygienic treatment, H. R. Harrower[1] recommends that administration of calcium in the form of **Calcium Lactophosphate** should be accompanied by organotherapy to assist its utilization. **Thyroid** ($\frac{1}{4}$ to $\frac{1}{2}$ gr. t.d.s.) he has found will decidedly influence the nutrition of the rachitic child. **Thymus, Pituitary**, and **Adrenal** extracts are recommended. **Pluriglandular** therapy, though empirical, he considers useful, and he advocates the following combination :—

R Desiccated Thyroid	1 part	Thymus Gland	3 parts
Total Adrenal Substance	2 parts	Excipient	10 parts

Two or more grains according to age, three times daily.

Carpani gives powdered and dried gland substances *in toto* in milk for fifty days, omitting them for one week after the first month's treatment, and he has noticed rapid and striking improvement, especially early in the treatment. The well-known beneficial effect of cod-liver oil is attributed by Harrower not only to the fat but also to the vitamines, and to a substance of a hormone nature which it contains. This is interesting in view of the discovery by Freund that alone of the fats, cod-liver oil leads to the retention of calcium. Marfan advocates 15- to 20-drop doses of adrenalin (1–1000) t.d.s., to relieve the pain and assist the progress of late rickets.

X-ray treatment recommended (p 49).

REFERENCES.—[1]*Proc. Roy. Soc. Med.* (Sect. for Dis. Child.), 1916, ix, 91–96 : [2]*Jour. Amer. Med. Assoc.* 1915, ii, 2062 ; [3]*Le Nourisson*, 1914, ii, 257 (*Brit. Jour. Child. Dis.* 1916, 178) : [4]*N.Y. Med. Jour.* 1916, i, 649.

RINGWORM. *E. Graham Little, M.D., F.R.C.P.*

Lane[1] recommends the following methods of treatment where *x* rays are not applicable. The hair should be cut closely, not shaved. Crusts should be removed by soaking with cotton-seed oil to which 1 per cent **β-naphthol** has been added, and the head washed with this soap :—

R β-naphthol	3 parts	Sap. Moll.	ad 100 parts
Sulphuris Præcip.	10 parts		

The hair should be depilated over the affected area with forceps, and the infected region painted daily with a lotion of 1 part **Tinct. Iodi** in 4 parts alcohol, and the following ointment applied :—

R Hydrargyri Præcip.		Olei Cadini	
Sulphuris Præcip.	1 part	Petrolati	10 parts
Resorcinol		Adipis Lanæ	

The head should be washed frequently with the soap indicated above. To prevent spread of infection, a closely-fitting cotton cap should be worn, and this should be frequently boiled or renewed. These measures are also applicable to the treatment of favus.

Lavinder,[2] who has had a large experience in the immigration hospitals at Ellis Island, describes a method of preparation of vaccines from favus and ringworm. The organisms were grown in a medium consisting of: chemically pure maltose, 4 grms.; Witte's peptone, 1 grm.; tap-water, 100 grms. The medium is then sterilized. The organisms are isolated by growing on glycerin-agar, and small patches of this growth are conveyed to the solution named above and grown on the top of an incubator. Under sterile precautions the growth thus obtained is washed, dried in an incubator, weighed, and rubbed up with sodium chloride and distilled water, cresol or tricresol added, the vaccine sterilized by heat, and its sterility tested by control culture experiments. When these tests demonstrate its sterility, and not before, the final stages are taken of pouring off the supernatant fluid and dispensing like a vaccine, 10 mgrms. of the dry material being put up with each c.c. of saline fluid. The initial dose given was usually 3 to 4 mgrms. Therapeutic results are not yet obtainable on any large scale, but so far as reported are "not brilliant."

Tinea bovina is exceedingly widespread among cattle in South Africa;[3] the majority of calves from a few months to a year old are affected. The disease seems to disappear spontaneously with the growth of the animal. Natives and less often Europeans in contact with infected cattle, readily contract the disease. Ricono records some interesting experiments, in which he was able to inoculate himself with the fungus derived from calves, the period of incubation varying from nine days in summer to three weeks in winter. Inoculations also succeeded with a horse and dog, but failed with a cat. The disease was much more severe in natives than in Europeans. In adults, the eruption is generally confined to the glabrous skin, especially of the legs and arms; in children, besides these parts, the scalp and face are frequent sites of invasion. In early stages the characteristic peripherally enlarging ring is noted, but vesication develops quickly, and there is much suppuration and scabbing. The general health is not impaired, but the eruption may persist for years, becoming quiescent in winter and active in summer. In Europeans the resemblance to eczema is remarkable.

The organism has been demonstrated to be a trichophyton very like *Tr. equinum*, growing well in maltose-agar and other media, at a summer temperature, and colouring the medium in which it grows a pink or brick red. The mould itself may acquire a yellowish tinge. The treatment recommended in recent cases is the application of an ointment of **Sulphur** (10 per cent), **Salicylic Acid** (5 per cent). In older cases a more strongly penetrating agent is needed, and **Chrysarobin** is the most effective ointment. **Tincture of Iodine** may effect improvement, but does not cure permanently.

Beck[1] has had some remarkable successes in *tinea barbæ* with the following treatment. The pustular nodules are injected with novocain, and ten minutes later **Tincture of Iodine** is freely syringed into the diseased region "until it trickles from every sinus." This may

be repeated in five days, and on an average three treatments are called for. The same method may be applied to kerions in children, and with them, slight general anæsthesia preceding the injection of novocain may be desirable.

References.—[1]*Ther. Gaz.* 1916, i. 334; [2]*Jour. Amer. Med. Assoc.* 1916, i, 945; [3]*S. Afric. Med. Rec.* 1916, 212; [4]*Jour. Cutan. Dis.* 1916, 606.

SARCOMA OF SKIN. (*See* Skin, Sarcoma of.)

SARCOMA OF UTERUS. (*See* Uterus.)

SCABIES. *E. Graham Little, M.D., F.R.C.P.*

Bruce and Hodgson[1] have evolved a very efficient method of treating scabies which has given brilliant results. The patient is subjected to the **Vapour of Burning Sulphur** while sitting in a cabinet "constructed on the lines of a 'home Turkish bath,' and made of ½-in. tongued and grooved match-boarding on a framework of 2-in. timber. It is intended to accommodate two patients at once. The dimensions are: Front, 4 ft. 7 in. by 4 ft. 2 in.; sides, 3 ft. 7 in. by 4 ft. 2 in.; the back is 5 ft. 3 in. high. As it is necessary for the cabinet to be used out-of-doors, we provided a canopy over it 2 ft. high, covered with canvas so as to protect the patients from sun or rain. The apertures for the head must be about 5 in. in diameter. The outer portions of the roof are movable, and capable of being adjusted after the patients are placed in position. The inside of the cabinet is lined with thick brown paper, and the roof junction with felt to prevent escape of vapour. One door is sufficient—it must fit closely. The seat consists of three narrow cross-bars 30 in. above the floor level. If made of one piece, the buttocks and nates would escape the action of the fumes. The cabinet must be placed near the bath-house.

"The patient is given a hot bath, allowed to soak for five minutes in the water, then well rubbed with soap—either soft or ordinary yellow bar—and the skin scrubbed to open the burrows. The patient is then transferred to the cabinet. A wet towel is applied round the neck to prevent escape of fumes, a sulphur candle (Jeyes' large sulphur candle) placed in the corner of the box is lighted, and the door closed. An orderly must remain constantly in attendance to remove the patient at once should he show signs of faintness or develop any difficulty in breathing from escape of fumes. At the end of fifty minutes the lid is quickly removed, and the patient returns to the bath-house, where he puts on clean and warm clothing."

A single treatment is all that is required. Bedding and all articles of clothing must be disinfected at the same time, where possible with superheated steam. Boots may be sprayed with formalin.

Reference.—[1]*Brit. Med. Jour.* 1916, ii, 177.

SCARLET FEVER. *E. W. Goodall, M.D.*

Louis J. Dublin[1] gives the results of an inquiry into the number of deaths and the causes of death amongst 1063 persons who had had an attack of scarlet fever. The inquiry covered a period of

three to four years after the attack (average 3·4 years), and was based upon certain records of the Metropolitan Life Insurance Company. Eighty-two per cent of the persons were children between two and ten years old ; it is to be noted, however, that, as the company has no policy-holders in the first year of life, no children of that age-period are included in the figures. The author states that the expected number of deaths amongst these 1063 survivors, allowance being made for age, sex, and colour (white or black), was 18·6 ; but as a matter of fact the actual number was 18. Three of the deaths were from endocarditis, 5 from respiratory diseases, and 4 from tuberculosis. The remaining 6 were due to causes of no particular interest so far as scarlet fever is concerned. It is interesting to note that in not a single one of the 18 cases was death due to nephritis.

The author also gives figures from the records of the insurance company mentioned above which show that the mortality from scarlet fever during the years 1911-14 amongst coloured children was about one-fourth that amongst white children. From figures quoted by the author it appears that scarlet fever seems more prevalent in New York City during the months December to May, at any rate during the years 1914 and 1915. He gives a curve of which the highest point is reached in March, the lowest in September. In the British Islands almost the reverse obtains.

Reference.—[1]*Jour. Amer. Med. Assoc.* 1916, i, 1667.

SCHISTOSOMIASIS. (*See* Bilharziasis.)

SCIATICA.[1] *J. Ramsay Hunt, M.D.*

The practical necessity sometimes occurs of diagnosing whether sciatica is genuine, in cases suspected of *malingering*. Subjective criteria are not sufficient, and an observant malingerer soon learns that pressure on certain points, and movement in certain positions, are expected to evoke pain, and accommodates his behaviour accordingly ; hence other criteria, objective and not capable of simulation, are necessary from a medico-legal point of view. Some of these symptoms are not invariably present ; others depend on the gravity of the disease, on its nature or duration, such as, for instance, diminution or loss of the Achilles jerk, local hypothermia, wasting, scoliosis, and increase in the amount of albumin in the cerebrospinal fluid as demonstrated recently by Sicard. Professor Boschi, however, calls particular attention to organic expressions of pain apart from the operation of the will, such as pupillary, sphygmographic, and sphygmomanometric reactions. To elicit these, Laségue's movement is performed on the affected limb, the angle formed with the plane of the bed when pain is produced being approximately noted ; the movement is then repeated on the healthy limb, during which the pulse is counted and the armlet of a Riva-Rocci sphygmomanometer adjusted until the radial pulse is obliterated, and the condition of the pupils is observed. Laségue's movement is now repeated on

the affected limb, and the patient watched so that he cannot produce pain by other means, such as tongue-biting. If pain be caused there will be a sharp, transitory, but marked dilatation of the pupil to the extent of 3 to 5 mm. An assistant feels the radial pulse in connection with the sphygmomanometer; increased arterial pressure caused by the pain will re-establish the pulse, but care must be taken that meanwhile the patient does not try to strain with a closed glottis, which will increase artificially the arterial pressure. The assistant then counts the pulse. Normally an increase of eight to ten beats a minute is caused by pain: but it is known that neurotic subjects may react to painful stimuli with a still more marked increase, or, on the other hand, sometimes with slowness or irregularity of pulse, so that variations of this character must be considered also as organic affirmation of painful movements. The control of the reaction on the healthy limb disposes of some of the objections that are sometimes raised against these variations in the pulse, i.e., the indefiniteness and variability of the so-called 'normal' with which the result obtained has to be compared, and the fact that numerical increases in the pulse may be due to psychical conditions of anxiety relative to the examination.

Reference.—[1]*Lancet*, 1916, i. 872.

SEA-SICKNESS, *Herbert French, M.D., F.R.C.P.*

From experience in his own case, Hart[1] deprecates the view that drugs are of no value in the treatment of sea-sickness; and he advocates for use in the acute phase of mal-de-mer the following mixture:—

R	Liq. Iodi Fort.		Aq.	ad ℥vj
	Acid. Hydrocyan. Dil.	āāxij		

One ounce of this is to be taken every ten minutes, and four doses may suffice to give very great relief. When the acute phase is over, but anorexia persists, he advises:—

R	Pot. Brom.	℥j	Tinct. Gent. Co.	℥iij
	Acid. Hydrochlor. Dil	℥iij	Spt. Chlorof.	℥j
	Liq. Strych.	℥j	Aq.	ad ℥vj

Half an ounce to be taken in water five minutes before meals.

See also under Vertigo.

Reference.—[1]*Lancet*, 1915, ii, 779.

SEMINAL VESICULITIS. (*See* Vas Deferens and Seminal Vesicles; Epididymitis.)

SEPSIS, LOCAL. *W. I. de C. Wheeler, F.R.C.S.I.*

Many interesting observations have been made with regard to the power of organisms to remain dormant in the tissues, and to become suddenly active after some slight surgical interference. In this connection it must be remembered that tetanus may arise in a case of re-operation on a wound long healed, and the importance of a

'safety' dose of **Antitetanic Serum** becomes manifest. Swan and Goadby[1] draw attention to the recrudescence of local sepsis in completely healed wounds. A number of cases are quoted to show that organisms may remain for a considerable time in the vicinity of a foreign body without giving rise to constitutional symptoms. Often, where mucoid fluid surrounded the fragment, the *Bacillus perfringens*, streptococci, etc., have been found. In one case the bacillus of malignant œdema had apparently lain dormant for five weeks, but was activated by an incision to provide adequate drainage. In another type of case there was a process analogous to anaphylaxis. The tissues, having originally been subjected to constant doses of bacterial poison, are, after an interval, subjected to an anaphylactic dose of the original poison.

Reference.—[1]*Brit. Med. Jour.* 1915, ii, 741.

SEROUS EFFUSIONS. *Herbert French, M.D., F.R.C.P.*

Huber[1] draws attention anew to the fact that autoserotherapy very likely plays an important part in the rapid recoveries that often result from exploratory puncture of serous effusions, especially pleuritic effusion. Even without tapping, the withdrawal of a few c.c. may be apparently curative. This cannot be due to the actual amount withdrawn, for this is minute in relation to what is left in the chest. It is not unlikely that the oozing of some of the remaining fluid from the pleural cavity into the subcutaneous tissues plays an important rôle in the result. This forms an argument in favour of not postponing the needling of a chest, even if it is not proposed to go to the extent of full paracentesis.

Reference.—[1]*N. Y. Med. Jour.* 1916, ii, 20.

SHELL SHOCK. (*See also* Psycho-neuroses of War.) *Bedford Pierce, M.D., F.R.C.P.* *Marguerite Wilson, M.B., Ch.B.*

The term 'shell shock' is loosely used to describe a variety of conditions, which range from death occurring without visible injury, to slight and transitory hysterical symptoms. Between these two extremes are found a series of slight and grave neurasthenic and psychasthenic states due to the strain of war.

Etiology.—The number of theories of causation are as numerous and varied as the symptoms exhibited. Forsyth[1] gives an analysis of the mental stress which, with fatigue, hunger, and other hardships, leads up to the point when a very slight stimulus is required to precipitate a mental breakdown. Strain of active service, physical fatigue, and hunger, all play a part. Rifle fire—especially sniping—and ghastly sights of carnage are very important. Most serious is the shell fire, especially high explosives. He states that the personal psychology of the individual is of most importance, and that in all severe cases a history of some earlier mental trouble, slight or severe, could be elicited. Some symptoms are due to self-criticism under shell fire.

Mott[2] describes some of the possible effects of the detonation of high explosives as follows: (1) Commotion from aerial compression; (2) Concussion, with or without burial; (3) Decompression, with embolism by bubbles of N or CO_2; (4) Inspiration of CO during aerial compression; (5) Prolonged inspiration of noxious gases—CO —while lying unconscious or partly buried.

The mental and bodily condition at t' e time of shock are important. He tabulates them: (1) Inborn—(*a*) Timorous disposition, anxious temperament; (*b*) Neuropathic or psychasthenic inheritance. (2) Acquired—(*a*) Reduced resistance in central nervous system due to alcoholism, syphilis, previous head injury; (*b*) Lowered neuropotential, the result of post-febrile neurasthenia; (*c*) Nervous exhaustion, the result of mental stress, anxiety, insomnia, terrifying dreams; (*d*) Bodily exhaustion from fatigue, cold, wet, hunger.

Elliot Smith[3] considers it would be a libel to say that all sufferers are mental weaklings. The condition is fairly common in senior non-commissioned officers. He believes that it is unjust and untrue to attribute all cases to fear. It must be remembered, however, that fear is a natural emotion, and therefore ineradicable,[1] and that it is protective. Mott[4] has pointed out the importance of fear in causation.

Grandclaude[5] says that the evolution of the commotional disturbance depends on (1) violence of shock, (2) general condition of patient before explosion, (3) antecedents. Few support the idea that antecedents are of no importance. Various writers have drawn attention to the rarity of shell shock in cases with severe wounds. These usually recover without a trace of shock. Burial, especially if it occurs more than once, is an important factor in causation, as also are blows with sandbags about head or spine, and the sight of a comrade being killed. In some cases there is an epileptic family history.

Rows[6] draws attention to the "importance of memories and experiences in earlier life with which a strong emotional tone was connected. These may be revived in dreams." This is of great importance in prolonged cases.

Pathology.—In a number of cases where death occurred without visible injury, multiple punctate hæmorrhages were found in the brain substance. Had life been prolonged, these areas might have led to blocking of tracts. We have at present no means of investigating the subtle changes, chemical and physical, that may be produced by shell shock in the central nervous system; yet that system is so delicate and complex that we must believe that very slight changes may cause breaks in the chains of neurons. Mott,[4] however, considers these hæmorrhages are due to gas poisoning.

Types of Shock.—It is impossible to classify the cases under headings such as hysterical, neurasthenic, or psychasthenic, as any one case may exhibit symptoms of any or all of these states. Death may occur instantaneously in one man, or a group of men, without any visible signs of injury. This occurs when a high-explosive shell bursts

near. The bodies are fixed in the position of the last act of life. With these cases may be grouped those which survive for a short time and exhibit the symptoms of stupor, suspension of psychic activity, and physical and mental asthenia.

Symptoms.—The immediate symptoms range from slight transitory disturbance to complete unconsciousness. The latter condition may end in death. The patients usually present some of the physical signs of fear—terrified expression, cold blue hands, restlessness, movements of hand across forehead.

At first the patient is heavy and dazed. Later, headache occurs. The pain may be most severe in the frontal or occipital regions, its character being burning or stabbing. It is worst at night, " especially when trying to sleep or when the mind dwells on terrifying experiences."[7]

The surface temperature is low. The hands are cold, clammy, and mottled. The expression is dazed, stunned, harassed, terrified, or depressed.

Cardiovascular Symptoms.—These include palpitation, precordial pain, tachycardia, small quick pulse, low blood-pressure. Mott[4] draws attention to the correlation of the physical signs of fear and low blood-pressure, which rises when fear passes off.

Sensory.—Hyperæsthesia is common. Pin-prick may produce a violent spasm (Myers[8]). There may be anæsthesia, or deficient thermal sensibility. Sensibility to deep pain is only lost in very severe cases. These conditions may be unilateral, bilateral, or confined to one limb.

Vision (*See* Eye, War Injuries to).—Patients may be psychically blind (Hertz and Ormond[9]). They grope about after the manner of people with very defective vision. The eyelids are closed, the lids flutter, and they resist their eyes being opened. The globes are turned up and in. The pupils are kept covered. In these cases the pupils react normally, and the fundus shows no changes. There may be photophobia, which does not disappear in subdued light, or diminution of fields of vision; smoky vision; failure of accommodation; sluggish light reflex.

Hearing (*see* Ear, War Injuries to).—Drumming noises in the ears. Complete deafness, or deafness on one side. Painful sensibility to sound. Changes in the tympanic membrane have been noticed in deaf cases.[4]

Speech.—Mutism may be associated with deafness, or may occur alone. Functional mutism due to loss of power (partial or complete) of adducting vocal cords. Stammering; repetition. Men suffering from mutism may shout during sleep.

Tremors.—Hands may present coarse or fine tremors. Present continuously while awake, and absent during sleep. May be general or confined to hand, arm, leg, or head. There may be rhythmic spasmodic movements, tics, twitchings, choreic or convulsive movements.

Gait.—Patient may absolutely refuse to attempt to walk. All types of gait are seen—dragging, dancing, shuffling. May require support.

Paralysis.—Monoplegias, hemiplegia, and paraplegia have all been observed.

Amongst other symptoms are rigidity, muscular over-reaction, aching, tenderness, wasting, localized pains (these pains tend to be localized at the seat of a former injury), giddiness, dyspepsia, and rarely vomiting.

Insomnia.—This is due to the constant state of anxiety and apprehension. Somnambulism.

Dream states are of great importance. The patient may go over in his sleep the actions he was performing at the time of the shock, though there may be no waking memory of the incidents. The dreams are terrifying in character, and the patient may suddenly awake in a cold sweat of terror. Elliot Smith[10] points out that if "the dreams are carefully noted, it will be discovered in many cases that the experiences at the front are blended with some episodes utterly alien to the war."

Mental Conditions.—There may be retrograde amnesia of variable length of time, inability to sustain attention, irresolution, indecision, irritability, difficulty in self-control, moroseness, feeling of fatigue without exertion, slowness of perception, confusion of ideas, or disorientation. These symptoms may become so severe that the patient exists in a constant state of worry and anxiety. "There is a repeated revival of memories of horrible incidents, terrifying dreams, and memories of incidents in past life. The normal freedom of mental activity is interfered with, and attention is fixed on disturbing influences, and offending memories and accompanying emotional states cannot be expelled."[6] Hallucinations and delusions may follow, or maniacal states often paroxysmal in type. Pronounced melancholia is sometimes developed.

Treatment.—This is a matter on which there is a great divergence of opinion. It must be borne in mind that these men are not malingerers, although now and then cases of malingering of course do occur.

It is recognized by most that *preventive measures* ought to be adopted, that is, the exclusion from the army of men with a direct insane inheritance who have had one marked attack of mental disorder (Savage[11]). It would seem desirable also to exclude known neurasthenics. This applies especially to the commissioned ranks, where a mental collapse at a critical moment may have such serious consequences.

In acute cases, complete **Rest in Bed** and **Good Food** are necessary. Complete mental and physical rest are required. At this stage patients do best in a single room.[1] This protects them from having to listen to constant references to the war, and leads to greater confidence when the case is under investigation. Isolation must, however, be used with discrimination, as it gives the patient ample opportunity to brood and revive unpleasant memories.

Shock cases do not do well mixed with wounded cases. Noise of any

kind, especially if loud and sudden, is harmful. General **Massage** and **Electricity** may be helpful. Mott[12] considers that what is required is a light airy room, books, games, music—that is, "commonsense interest in comfort, welfare, and amusements. Sympathy should be shown, but should not be misplaced. Be cheerful and look cheerful."

Insomnia is best treated by continuous **Hot Baths.** They are also of use in cases of tremor.

Mutism.—**Bromides, Valerian,** and **Faradic Current** succeed in some cases. Some sudden shock may bring back speech—one mute shouted when he saw a comrade fall into the river. Myers[13] uses **Hypnotic Suggestion.** He finds that he must first dispel all pain in the throat by suggestion before he can induce speech. Speech may return during light anæsthesia. The prognosis in mutism is good. MacMahon[14] describes the re-education of stammerers.

Blindness.—Hertz and Ormond[9] state that all treatment failed until they adopted **Hypnosis** and **Suggestion.** Only a very slight degree of hypnosis was required.

Errors of Gait are usually treated by simple exercises and re-education in walking. Rest in bed and massage are not very successful.

Hypnosis.—MacDougall[15] says that he is less hopeful about this method of treatment than he was formerly. It was advantageous in about 10 per cent of cases. It does best in insomnia, and also helps to abolish bad dreams. In a good many cases it is unwise.

Myers[13] treats by hypnosis. He finds that any pain must first be dispelled by suggestion. He believes that hypnotic treatment proves of great assistance towards recovery, though recoveries may not always be immediately complete or permanent.

Mott[12] says: "I do not find hypnosis or psycho-analysis necessary or even desirable."

Elliot Smith[3] states that hypnotic suggestion is of no use when illness is of long duration, that is, when ante-war worry or emotion is a prominent factor. In these cases it may remove the symptoms, but not the cause. It may remove insomnia, pain, or amnesia when these are due only to recent shock. He thinks there is grave danger unless it is used with great care and tact, and prefers to use "psycho-therapy by persuasion, that is, simple talks and explanations."

Tombleson[16] says that few patients have any prejudice against treatment by hypnotic suggestion, and that it is very successful if used within a reasonable time of onset. In 17 out of 20 cases he found it necessary to induce somnambulism; in 3 out of 20 earlier stages only were induced. So far all these cases have remained well.

Suggestion during chloroform anæsthesia has been used by Milligan.[17] The suggestion is employed during the early stage, when the patient is peculiarly susceptible. After they come round they are assured of recovery, promised complete rest, and given morphia if necessary.

Psychotherapeutical Methods (see further under MENTAL DISEASES). —Forsyth[1] says few require thorough treatment by psycho-analytical methods. In a minority of cases he considers that it must be done.

and if there is a second breakdown, the use of this method is clearly indicated.

Rows[6] says that "after the manifestations of shock have disappeared there remains a residuum. The causes of the persistence of this residuum must be investigated. It must be explained to the patient that every incident is accompanied by its own special emotional state, and that this emotional state can be reawakened by the revival of the incident in memory. The patient will thus be led to see that it has been no gross disease and no supernatural ageney which has disturbed him." He goes on to say that this sweeps away the mystery of the illness, and that the physician must now explain the mechanism of loss of control. The patient must be led to face the trouble and reason with it. In the first place the physician must gain the confidence of the patient and induce him to co-operate.

Elliot Smith[10] says: "It is impossible to exclude the influence of past history and experience." He draws attention to the influence of the literature which the patient has studied during adolescence. He advises "full, frank, and free discussion of disturbing factors," and believes that "continuation of the trouble may be due to incidents which may appear to be trivial and to have no connection."

Electricity has been used in different forms. Garton[18] explains fully one method, and states that all patients made rapid progress towards recovery.

Aldren Turner[19] gives an account of the various military hospitals where shell shock is treated. The cases are seen at a British base hospital by a special medical officer, then sent to a special section as symptoms are neurological or mental. Mental cases go to D Block, Netley. Cases which recover sufficiently, but are not fit for duty, are sent to Maghull or Springfield War Hospitals—that is, cases of protracted neurasthenia and mild psychoses. Cases which are certifiable are sent to Napsbury or Dykebar War Hospitals. These are cases of acute mental disorders. None are certified as persons of unsound mind. After a reasonable period of treatment, epilepties, cases of general paralysis of the insane, and formerly certified cases are discharged to asylums.

After-treatment.—Forsyth[1] says that it is doubtful if any cases of shell shock ought to be sent back to the firing line. "Recovery is delayed by unconscious resistance to the thought of returning to the front." Often the mere mention of returning produces a return of the nervous symptoms. Elliot Smith says that "traumatic hysteria tends to persist until the conclusion of peace."

References.—[1]*Lancet*, 1905, Dec. 25; [2]*Ibid.* 1916, Feb. 26; [3]*Ibid.* April. 22; [4]Meeting of Royal Society of Medicine, Maudsley Hospital (unpublished); [5]*Jour. de Méd. et Chir. Prat.* (*Brit. Med. Jour.* 1916, Oct. 21); [6]*Brit. Med. Jour*, 1916, Mar. 25; [7]*Lancet*, 1916, Feb. 12; [8]*Ibid.* Mar. 18; [9]*Ibid.* Jan. 1; [10]*Ibid.* April 15; [11]*Ibid.* Aug. 5; [12]*Ibid.* Mar. 11; [13]*Ibid.* Jan. 8; [14]*Brit. Med. Jour.* 1916, Dec. 16; [15]Royal Society of Medicine (unpublished); [16]*Lancet*, 1916, Oct. 21; [17]*Brit. Med. Jour.* 1916, July 15; [18]*Ibid.* Oct. 28; [19]*Lancet*, 1916, May 27.

SHOCK (Crile's Theory). *W. I. de C. Wheeler, F.R.C.S.I.*

For some years the theories of Crile, of Cleveland, in relation to shock, and its prevention by the blocking of afferent stimuli along the nerves with local anæsthetics, have fascinated and attracted the attention of numerous surgeons. E. M. Corner, in a striking paper, describes the methods pursued by Crile in his daily work. Crile asks himself the questions, Why do we die ? What are the results of stress and strain on our tissues ? On what organs do those effects principally fall ? How can they be minimized and life protected ? With his collaborators he made a very large number of experiments. He found that if an organism was submitted to strain or stress the results could be found throughout the body, but were most marked in certain organs—the brain, the liver, the suprarenals, and the thyroid. These organs, according to Crile, form a system which he calls kinetic. In support of his theories it is pointed out that in the normal cerebellum certain cells stain well, but as the result of sleeplessness the same cells hardly stain at all. Sections of the suprarenal gland also show changes in the cell protoplasm and the nucleus as the result of insomnia. Under ordinary conditions such physiological changes are transitory, and disappear after rest and food ; if the latter are withheld, repair is slower ; and finally, if the change has been allowed to go too far, there is no repair and death takes place. Intestinal stasis results in the formation of indol and skatol, and when these substances were injected into animals, changes were produced in the cells of the organs mentioned similar to those which resulted from insomnia, physical exertion, and fright. Corner further points out that after surgical or medical infection, similar cell changes took place in Crile's kinetic system. In his early papers on shock, Crile proved, by experiment and histological investigation, that the administration of ether was also responsible for brain-cell changes. All these statements stimulate an inquiry by the practical surgeon as to how modern treatment may be affected by such discoveries.

Corner's paper gives many practical details which deserve attention. For example, **Morphia** is used repeatedly in the hospital at Cleveland, to prevent destructive changes in tissues arising from the disease, or the stresses of the necessary treatment. **Nitrous-oxide Anæsthesia** is used because it does not destroy the cells to anything like the same extent as does ether. Anoci-association is rigorously carried out in the manner familiar to all surgeons. Acidosis as a result of anæsthetics receives careful attention. The condition is very common in children, associated with periodic vomiting and delayed chloroform poisoning.

In dealing with acidosis, Crile concentrates his attention on the liver. He tried to neutralize the acidosis by the administration of **Sodium Carbonate.** He then filled up the storehouses of the liver with sugar to provide a surplus to be burned up before destruction of the liver-cells took place. Delayed chloroform poisoning was found to be prevented to a large extent by this method.

Corner concludes his paper on his personal observations at Cleveland by mentioning that Crile had performed **Adrenalectomy** with success.

REFERENCE.—[1]*Clin. Jour.* 1916, 221.

SINUSES, TUBERCULOUS. *W. I. de C. Wheeler, F.R.C.S.I.*

Bennett,[1] after discussing the objections to the use of iodoform and bismuth, and the operation of scraping, states that the continuous action of a stimulating antiseptic is necessary on account of the pyogenic infection present in sinuses. He tried spirit solutions of camphor, thymol, and **Menthol**, and was impressed with the results of the last. Menthol, as is well known, is highly soluble in alcohol, and a solution can be prepared very rapidly. Five grains menthol in a drachm of methylated spirit is a most serviceable strength. White plugging gauze is soaked in the solution and used as a packing for a sinus without change for three days. The writer claims that menthol used over a sufficiently long period is superior to iodoform, iodine solutions, bismuth salts, and the other substances at present so extensively used for the cases under notice.

REFERENCE.—[1]*Glasgow Med. Jour.* 1916, Feb., 107.

SKIN DISEASES, GENERAL THERAPEUTICS.

E. Graham Little, M.D., F.R.C.P.

MacKee,[1] in an interesting review of the progress of therapeutics in skin disease, emphasizes the importance of the recognition of the connections of dermatology with 'internal medicine.' He notes the encouragement offered by the experiments with **Vaccines** in cases of ringworm and favus, in which they may ultimately replace *x*-ray treatment. Vaccine therapy in acne he considers has been a failure in New York, but he praises the method in furunculosis and tuberculous affections. The **Kromayer Lamp** has been found useful in acne, psoriasis, alopecia, eczema, and lichen planus; but he has had no marked personal success in tuberculosis, lupus erythematosus, or the vascular nævi. Modern methods of regulating **X-ray** dosage and filtering the rays have allowed of the extension of their use to many dermatoses. The superior value of **Radium** to *x* rays in some conditions may be explained by the possibility of utilizing low-penetration gamma rays and beta rays; these are not obtainable at present from *x*-ray tubes, but experiments are being conducted with the end of producing them for therapeutical purposes from this source. He regards radium as superior to *x* rays in the treatment of leukoplakia, lupus erythematosus, and deep-seated vascular nævi. **Autoserum Therapy** has been a disappointment in his experience. He considers freezing by **Carbon Dioxide** the best treatment for nævi and lupus erythematosus, but condemns its use in the epitheliomata.

Sprays.—This paper[2] has a melancholy interest as probably the last to be contributed by Allan Jamieson. The use of sprays is necessarily restricted to quite superficial affections, and is especially valuable in

seborrhœic dermatitis. The ordinary hand-spray with atomizer and bulb is advised. The lotions used may be either spirituous or oily. Of the first the author's favourite formula is this :—

R	Euresol	℥ij	Ol. Ricini	℥ss
	Spt. Formicarum	℥j	Spt. Vini Rect.	ad ℥viij
	Spt. Rosmarini	℥ss		

Since **Euresol** may at present be difficult to obtain, it will be as well to mention that **Resorcin** is the best substitute, 1 dr. of this replacing the 2 dr. of euresol. The scalp should be shampooed, as a preliminary to its use, with fluid extract of quillaia, 1 to 2 teaspoonfuls to a washhand basin half full of warm water. The scalp must be dried and then sprayed. For an oily lotion, sesame oil 1 oz., with resorcin 10 gr., is recommended. It is important to remember that when resorcin or its derivative euresol is used, soap should be excluded from the toilet.

Aikins[3] has used **Trichloracetic Acid** with benefit in several affections in which thickened and hardened skin is one of the symptoms. When there is much hypertrophic excrescence, this should be planed down with a curette, prior to the application of the acid, which may be rubbed on to the area to be treated with a glass rod or a probe or match-end. Before application the surface should be wiped over with ether or alcohol, and the normal skin protected with a film of vaseline. When the treated tissue whitens, or the patient complains of a stinging smarting, the rubbing should cease, and the surface be wiped over with a wet cloth. The acid may be used either as the pure crystals or in a concentrated solution resulting from the addition of a few drops of water to the crystals. The method was used with special success in senile keratosis, in lupus erythematosus, in lupus vulgaris, in obliterating small telangiectases, in reducing scar tissue, and in condylomata.

Davis[4] uses a more elaborate technique, which is thus described : "The method most satisfactory in its employment is, first, to cleanse the surface of the skin thoroughly with benzine—to remove the oil so as to facilitate the acid's penetration ; second, to further cleanse the area with an alcohol-pad. Then I apply a saturated solution of the acid to the area to be operated on, with a bit of cotton twisted on a Japanese bamboo toothpick until the surface turns a milk-white. Next, I apply a pad of cotton wet with water. This appears to cause the acid to act more thoroughly on the tissues. When I think the acid has acted sufficiently, I neutralize it with an alkaline solution, preferably a 4 or 5 per cent Labarraque's solution. The cauterized area is covered with an 'ichthyol varnish,' i.e., 25 per cent ichthyol in a saturated solution of boric acid, to which is added 8 gr. of tragacanth to each ounce, to emulsify. When nearly dry, I embed a bit of teased-out cotton. This acts the same as the woof in a carpet. This is again painted over with the ichthyol varnish. When dry, this makes a fixed, permanent dressing. I see the case from day to day, and, if no signs of secondary infection occur, I allow this original

dressing to remain on until the wound heals over. In the vast majority of cases there is no secondary infection to be contended with, if the whole procedure has been carried out under proper aseptic precautions."

The method is recommended, with certain modifications in *xanthoma*, in which it is regarded as the best treatment ; in *molluscum contagiosum* ; in spider and cavernous *nævi*, in which he prefers it to the use of carbon-dioxide snow ; for *warts*, and the fibrous growths which appear on the shoulders in middle age. For small *rodent ulcers* the procedure is as follows : The crusts are removed with a salicylic diachylon ointment, powdered cocaine is dusted on it, and the surface curetted. Cocaine is again dusted on, and the acid applied until the base and edge are cauterized. Ichthyol varnish is then applied. For *fissures* of the lip and anus, for *milium*, for *lichen planus papules* in the mouth, and in *herpes simplex*, the author paints the lesion with the acid. In *acne varioliformis*, small plugs of cotton soaked in the acid are introduced into the cavity with a pointed stick and left for a few minutes.

Crude Coal Tar.—C. J. White[5] has used for many years, " in almost every moist non-pustular condition of the skin," the following preparation :—

R	Crude Coal Tar		Amyl. Maidis	
	Zinc Oxide	āā 2	Vaselin	āā 16
		Ft. ung.		

This paste is to be applied twice daily under one layer of thin compress until the moist condition has dried up, or until pustules develop, in which event it should be stopped. In three cases White found some symptoms of absorption of toxic products with this treatment, which he ascribed to an accidental contamination of the crude product, perhaps from the vessels in which it was conveyed, as on obtaining a fresh supply no further adverse symptoms appeared.

Autoserum Injections.—Gottheil,[6] who was one of the first to use this treatment, contributes some further experience of it in the past two years. He claims for it that in some unexplained way it modifies skin reaction and skin resistance, so that, in certain usually very obstinate or even entirely resistant dermatoses, satisfactory results are obtained in a very much shorter time than without its use, and in some cases relapses are postponed which would otherwise have taken place. This has been particularly the case with *psoriasis*, and the author goes so far as to say that he can promise, even in the severest case, to clear the eruption in from two to ten days. No local treatment is given until four or six injections have been administered. In *chronic eczema* the improvement was much less constant. In *urticaria* the treatment was usually beneficial. In pemphigus, contrary to the claims of other writers, and in lichen planus, improvement was only very temporary. In syphilis it was useless.

Heliotherapy.—Towle[7] reports a small series of cases treated with exposure to direct sunlight, with beneficial results, especially in

tuberculosis other than lupus, and in pyogenic affections. The exposures should be graduated, small portions of the body being stripped to the light and for a short time, and the areas and duration of exposure should be increased under careful observation, the first appearance of erythema being a caution to cease the treatment for the time. The whole surface should eventually be exposed, even though the disease should be limited, and an hour's exposure usually suffices. The author contends that his results show that the treatment promotes the general bodily vigour, discourages the growth of bacteria, stimulates the restoration of the epidermis, reduces congestion, encourages the absorption of pathological exudates, especially of scar tissue, and, above all, tends to relieve pain. As the experiments were carried out in the variable climate of New England, the experience is very encouraging.

Ultra-violet Radiation. *See* p. 53.

REFERENCES.—[1]*N. Y. Med. Jour.* 1916, i, 441; [2]*Brit. Jour. Dermat.* 1916, 104; [3]*Canad. Pract. and Rev.* 1915, 479; [4]*Jour. Cutan. Dis.* 1915, 691; [5]*Ibid.* 1916, 497; [6]*N. Y. Med. Jour.* 1916, i, 1209; [7]*Jour. Cutan. Dis.* 1915, 847.

SKIN, PYOGENIC INFECTIONS OF.

E. Graham Little, M.D., F.R.C.P.

Adamson[1] groups a number of conditions which in recent years have been demonstrated to be due to direct infection of the skin with pyogenic organisms, and separates those due to streptococcic and staphylococcic causation. The typical features of the streptococcic contagion are the formation of a vesicle or blister, and its superficial nature as compared with staphylococcic lesions, which are pustular. The staphylococcus usually very soon contaminates the clear streptococcic vesicle, and as it grows much more readily on solid media, the streptococcic origin is often missed. A method of growing the streptococcus from such a mixed infection is explained. "The cultures are made from a drop of the serum which oozes from the raw surface of the base of the lesion after the crusts have been removed and the raw surface has been rubbed clean with alcohol. The drop of serum is put into the condensation water of the culture tube, which is then allowed to flow over the surface of the medium, and the tube is incubated for twenty-four hours. The streptococcus colonies are seen as smaller white spots among the larger colonies of staphylococcus."

The affections thus demonstrated to be streptococcic in origin are :—

1. *Impetigo contagiosa*, which begins as a vesicle, speedily becomes purulent and crusted over with a yellow scab, or it may partially heal in the centre while spreading at the edges, and form the so-called 'impetigo circinata,' which is often mistaken for ringworm. The post-aural eczemas of children and intertrigo of flexures are usually impetiginous, as is also the pus-infection associated with pediculi capitis.

Impetigo contagiosa may also occur on the beard, and is often mistaken for the staphylococcic folliculitis known as sycosis, a much

more intractable disease, from which it is to be distinguished by the superficial character of the crusts, the diffusion outside of the hair follicle, and the superficial excoriation under the scab. The eruption of impetigo may occur as a widespread bullous rash, especially in newborn infants, in which it is known as *pemphigus neonatorum*. Its distinction from pemphigus and from syphilis, with which it is frequently confused, is important.

2. *Ecthyma* is a type of deep-seated ulceration, which is the sequel of a streptococcic impetigo in poorly-nourished patients, especially in the napkin area in young children, and on varicose legs, where the confusion with syphilitic ulcers is frequent. Their origin in a superficial blister or pustule is the best differentiation.

Two forms of chronic streptococcic infection should be noted; the impetiginous fissure with associated recurrent cellulitis (*elephantiasis*) especially prevalent on the upper lip, and in varicose conditions, and *impetigo pityroides*, which occurs as dry scaly patches, usually around a fissure, and frequent in the neighbourhood of the mouth.

The treatment of impetigo should include the careful removal of the crusts, and the application of an antiseptic ointment or lotion to the raw surfaces. This should be practised several times a day. An ointment of **Ammoniated Mercury,** 10 gr. to the ounce, is usually effective. For fissures, the best treatment is cauterization of the surface with **Silver Nitrate.**

Home[2] recommends the following dry dressing for suppurative skin conditions: "The suppurating surface is gently wiped dry with a clean piece of 3 per cent **Cyanide Gauze**; another piece, only slightly larger than the actual sore and about 6 to 8 ply in thickness, is laid on, dry and fixed with strips of zinc oxide or other adhesive plaster, imbricated so as to make a watertight dressing. It is very important to cover the gauze completely, and the thickness of the gauze dressing varies with the amount of probable discharge. This dressing may be left untouched for one, two, three, or four days, according to indications. If comfortable, with no lymphatic evidence of absorption, the less often it is disturbed the better. Subsequent dressings are done exactly in the same way as the original. It is important to cover the gauze completely with the adhesive plaster—firstly, to give accurate fixation and mechanical protection, and secondly, to retain in the gauze moisture sufficient to keep the serum at normal consistence and to prevent the dressing sticking to the raw surface. It is, of course, necessary to get the whole infected area completely exposed for the dressing—that is, to remove all crusts and scabs and overhanging cuticle, as in suppurating blisters."

Boils, in whatever stage they may be, should be freely opened. "Gentle pressure is applied to get out only what pus will come easily; the surface is dry-wiped and then dry-dressed exactly as already explained, preferably with a film of fresh blood over the boil. At first the gauze pad is made fairly thick and, if there is much pus, renewed twice a day. There is very little pain after the initial dressing, and the

core usually comes out on the third or fourth day." At the first and the last dressing the surrounding skin should be painted with **Tincture of Iodine.**

Experiments were carried out by Dennie and Bufford[3] with **Vaccine** treatment on a number of cases which were selected as being chronic, having persisted for over three months, and during the experiment all external treatment was withheld, but ordinary hygienic medication and diet were prescribed. Of 70 cases so tested, 35 were of acne vulgaris, 21 of furunculosis, and 14 of folliculitis. Comparison was made of the effect of autogenous and stock vaccines, the stock, like the autogenous, being prepared by the writers themselves. Details of the methods used are fully supplied. The doses employed varied from 100 to 2000 million. The dose was regulated by the degree of *local* reaction at the site of injection. If no reaction occurred, the preparation was regarded as ineffective, and discarded.

The acne patients were dieted, and local applications of soap and hot water, followed by mechanical removal of comedones, constituted the sole external treatment. Cases of acne were classified according as there were (1) much pus (furuncular), (2) indurated lesions without free pus, and (3) uncomplicated comedo formation.

From an analysis of results, several points of interest are established. Autogenous vaccines proved more effective than stock except in the treatment of furunculosis, where no difference could be discerned. It is somewhat surprising to find the absence of the *Staphylococcus aureus* in acne, and its relative infrequency in folliculitis. It will be noted that the authors worked only with large doses of acne vaccine, the optimum doses varying from 200 to 1500 million. It is also noteworthy that they found that the average number of doses required was eight in acne, four in sycosis, and four in furunculosis. These results are certainly striking and enviable. The intervals between the injections which succeeded best were five days in acne, four in furunculosis, and seven in sycosis.

References.—[1]*Clin. Jour.* 1916, 113; [2]*Brit. Med. Jour.* 1916. i, 14; [3]*Boston Med. and Surg. Jour.* 1915, ii, 910.

SKIN, SARCOMA OF, *E. Graham Little, M.D., F.R.C.P.*

Gilchrist and Ketron[1] give a careful report of two cases of idiopathic hæmorrhagic sarcoma (Kaposi's disease). In the first case there were from four to five hundred nodules scattered chiefly over the upper and lower extremities, including the toes, soles, fingers, palms, nose, cheek, chin, and ears. The lesions began as reddish pigmented nodules the size of a pea, which enlarged to form in some cases plaques 5 by 7 cm. in diameter. The hands, forearms, legs, and feet were deeply œdematous. Numerous hæmorrhagic and cyanotic areas were present, especially on the face. The trunk remained free, and mucous membranes were unaffected. The blood was normal, and all the natural functions remained unimpaired. In the second case there were only six distinct lesions, all on the face, somewhat

resembling rosacea, but in more deeply infiltrated patches. These had been present for two years, without causing any subjective symptoms. Diagnosis was confirmed by histological examination. Sterile emulsions of the affected tissue were prepared, and portions of this, filtered and unfiltered, were injected into the patient and also into a chicken, without any effect whatever, whether of amelioration of the disease or of fresh infection.

The most effective treatment was found to be the application of filtered **X-Rays** which completely cleared the eruption in the second case, and of **Radium.** The histological investigations showed that the disease begins as an angioma, with proliferation and dilatation of the capillaries, proliferation of the connective tissue and endothelium, and gradual obliteration of the blood spaces, which are converted into solid tumours. Sclerosis of the smaller arteries occurs. Death by metastases may result.

REFERENCE.—[1]*Jour. Cut. Dis.* 1916, 429.

SKIN, SYPHILIS OF. *E. Graham Little, M.D., F.R.C.P.*

The American Dermatological Association conducted an interesting symposium at its meeting in 1916 on the question as to the teaching of syphilis, and there was a whole-hearted assent to the proposition that the dermatologist should be entrusted with this teaching. We in England are at the present moment confronted with the same problem, and Zeisler's[1] arguments in opening the debate may interest readers of the MEDICAL ANNUAL. He points out that discrimination of the rash from other dermatological eruptions needs a trained dermatologist as much as ever before, and deprecates the too great and often fallacious reliance upon laboratory tests so prevalent nowadays. Because, he remarks, the primary lesion of lues often occurs upon the outer genitalia (i.e. the skin), does not seem a sufficient reason for handing over the subject to the genito-urinary surgeon. Independent departments of syphilis are a retrograde step. No person would be willing or capable or bold enough at this stage of specialization to grapple with the problems of syphilis as it affects the special organs, the skin, the nervous system, and the viscera. The relegation of the teaching of syphilis to the dermatologist is justified on the ground that the inception of the disease is almost without exception upon the skin. "The further phenomena in untreated cases are predominantly upon the outer integument, the mucous membranes, and in the superficial lymph-glands. It is at this period that diagnosis and treatment are of paramount importance. If properly recognized and skilfully managed, it should be possible, in many cases, practically to abort the disease and prevent the invasion of other organs; treatment begun at the right moment and persevered in, according to the best traditions, should reduce the affections of the eye, the nose and throat, the bones, and the deeper organs, to an almost negligible quantity. It would be indeed an ideal state of affairs if, by such timely treatment, syphilis should never develop beyond its cutaneous career."

Gottheil[2] gives useful differentiations of some parallel lesions respectively due to syphilis and tuberculosis, which he tabulates conveniently as follows. The classes compared have a superficial clinical resemblance which may sometimes be very baffling.

Lupus Vulgaris.	Tubercular Syphiloderm.
1. Begins usually in childhood.	Begins usually after puberty.
2. Course very slow; takes years.	Course fast; takes days or weeks.
3. Nodules soft, yellow, apple-jelly like, deep-seated, not protuberant.	Nodules firm, brownish-red, and protuberant.
4. Ulcers superficial, irregular, with markedly undermined edges and slight discharge.	Ulcers deep, with sharp edges and much discharge.
5. Crusts scanty and reddish-brown.	Crusts large, greenish-black, and lamellated (rupial).
6. Concomitant signs of tuberculous disease; positive tests for tuberculosis.	Concomitant signs of syphilis past or present; positive blood-test.
7. Scars hard, yellow, and shrunken.	Scars superficial, white, soft, and smooth.
8. Possible history of tuberculosis in patient and family.	Possible history of syphilis.
Tuberculosis Cutis Verrucosa.	**Tubercular Syphiloderm.**
1. Lesion single, growth extremely slow.	Lesions often multiple, growth rapid.
2. Almost always on hands and forearms only.	Seated anywhere.
3. Dry and verrucous always.	Ulcerates frequently.
4. Colour violaceous.	Colour reddish-brown.
5. Never crusted.	Frequent crusting, perhaps rupial.
6. Possible concomitant signs of tuberculosis, tests and others.	Possible concomitant signs of syphilis.
7. Possible history of tuberculosis.	Possible history of syphilis.
8. Does not react to antiluetic treatment.	Reacts to antiluetic treatment.
9. Occurs chiefly in male adults who have been exposed to dead or living animal tissues.	Occurs in anyone.
Miliary Tuberculosis.	**General Papulotubercular Syphiloderm.**
1. Extremely rare.	Very common.
2. Extremely chronic; takes years.	Course rapid; takes days.
3. Occurs mostly in children.	Occurs mostly in adults.
4. Ulceration and crusting common.	Ulceration and crusting rare.
5. Concomitant signs and test for tuberculosis.	Concomitant signs and tests for syphilis.
6. Usually follows a severe eruptive fever.	No such connection.
7. Does not react to antiluetic treatment.	Reacts to antiluetic treatment.
Scrofuloderma.	**Exulcerated Gumma.**
1. Occurs chiefly in children.	Occurs chiefly in adults.
2. Course extremely chronic; takes months and years.	Course much more rapid; takes days and weeks.
3. Occurs in connection with a chronic adenitis, most often around the neck.	Has no such connection.
4. Ulcer oval or rounded, edges thin, undermined, violaceous; base uneven and covered with flabby granulations.	Ulcer irregular, edges thick, reddish-brown, base irregular and hypertrophic, discharge abundant and gummatous.
5. Scars irregular, knotty, and hard; tend to become keloidal.	Scars smooth, soft, and white.
6. Concomitant signs, symptoms, and history of tuberculosis.	Concomitant symptoms, signs, and history of syphilis.
7. Does not respond to antiluetic treatment.	Responds to antiluetic treatment.

Tuberculosis Cutis Orificialis.	Tertiary Gummatous Ulceration.
1. Extremely rare.	Very common.
2. Course extremely chronic; no tendency to healing.	Course more rapid; tendency to final spontaneous healing.
3. Seat always near a mucous orifice.	Seat anywhere.
4. Miliary nodules probable in base and neighbourhood of ulcer.	No miliary nodules.
5. Concomitant signs, symptoms, and history of tuberculosis always present.	Concomitant signs of syphilis possibly present.
Acnitis and Follicitis.	**Papular and Pustular General Syphiloderm.**
1. Seat on face and arms.	Seat on the general body surface.
2. Course extremely chronic, lasting years.	Course comparatively acute; lasts days and weeks.
3. Active and past lesions, in all stages, present at one time.	Lesions in practically one stage at the same time.
4. Lesions usually few.	Lesions usually many.
5. Concomitant symptoms, signs, and history of tuberculosis probably not present.	Concomitant symptoms, signs, and history of syphilis probably present.
6. Does not react to antiluetic treatment.	Reacts to antiluetic treatment.

Gottheil puts in a plea for wider use of local treatment of syphilitic lesions in combination with the general measures, which do not succeed alone so well as when given with local applications. Of the latter, the most widely useful is **Mercurial Plaster** (strength not specified) covered with zinc oxide plaster to protect the clothing. Ulcerated scabs should be softened with soaking in a 2 per cent mixture of salicylic acid in olive oil, and then dressed with 5 to 10 per cent solution of **Oleate of Mercury** in oil. Wet compresses of bichloride of mercury are deprecated as often producing local inflammatory reaction.

References.—[1]*Jour. Cutan. Dis.* 1916, 583; [2]*Ther. Gaz.* 1916, 457.

SKIN, WAR AFFECTIONS OF. *E. Graham Little, M.D., F.R.C.P.*

Milian[1] has some interesting observations on the incidence of disease in soldiers on active service. Scabies and ringworm have been especially prevalent; the latter, it is suggested, owing to the collection of large troops of animals for feeding the men. Phthiriasis was naturally very frequent, and produced ecthymatous scratch lesions, and often large and deep ulcers. The treatment most effective for this condition was to cleanse the limb, paint the lesions with **Tincture of Iodine** and **Oxygenated Water,** and dress with 1 per cent **Picric Acid.** Alopecia areata was not frequent, and no connection with emotional shock was noticeable. Tuberculosis was relatively very infrequent as compared with civil practice. This he explains by the better condition of the men living in the open air, and their better feeding.

Desaux[2] divides the *dermatoses arising from wounds and sinuses* into two main categories: (1) The local reaction round or upon a wound, microbic in origin; (2) The influence of the wound and its dressings on some general and antecedent cutaneous disorder.

1. In the first group the usual conditions are those of a limb gravely damaged, with sinuses leading down to diseased bone, ill-formed scar-tissue, with defective vascularization, and with innervation impaired. Often repeated radiographic pictures have been taken, and the effect of *x* rays on damaged tissue is itself sometimes formidable. The skin surrounding the wound is probably injured by the use of antiseptics and by the flow of discharges from the wound, mainly streptococcic. Secondary infections of the adjacent skin usually take place, chiefly in the form of streptococcic bullæ, but also as a pustular folliculitis, deeper seated and of staphylococcic causation, the *Staphylococcus aureus* being the commonest form.

The treatment consists in stopping the use of antiseptics as soon as the patient complains of itching round the wound, which is a sure precursor of the coming dermatitis. Tincture of iodine is especially pernicious in this respect. The skin round a sinus should be protected, prior to each dressing, with **Zinc Ointment.** For the dermatitis when constituted, dressings of **Eau d'Alibour** diluted 1–10 are recommended. [The formula of this preparation is somewhat inconstant, but is thus given by Sabouraud: Zinc. sulphate 7 grms., cupric sulphate 2 grms., camphor ½ grm., saffron ½ grm., aq. de t. 300 grms.—E. G. L.] When the wound has been cleaned by these dressings, the surface should be painted with a 1 per cent solution of **Nitrate of Silver,** and then an ointment of **Collargol** 1–10 applied. When by these means the surface is disinfected completely, the following ointment should be spread on it daily :—

℞	Crude Coal Tar	1 grm.	Lanolin	6 grms.
	Ichthyol	2 grms.	Vaseline	8 grms.
	Oxide of Zinc	6 grms.		

After some five or six days of this, the area should be painted with crude **Coal Tar,** which may be left for forty-eight hours, when the above ointment may be resumed.

To prevent secondary infections of the neighbourhood this should be protected with a paste such as this :—

℞	Boric Acid	1 grm.	Oxide of Zinc	6 grms.
	Camphor Powder	0·5 grm.	Lanolin	6 grms.
	Ichthyol	1 grm.	Vaseline	8 grms.

These secondary infections are often more difficult to deal with than the original area, and may persist after that is well ; their prevention is then important.

2. The second group of effects is largely conditioned by the local use of antiseptics required by the wound. It is important to recognize that dermatoses such as eczema and psoriasis may be rendered much worse and more rebellious by the co-existence of conditions, such as have been mentioned above, associated with the wound. Otherwise treatment follows the practice appropriate to the individual dermatosis concerned.

References.—[1]*Brit. Med. Jour.* 1916, i, 26 ; [2]*Presse Méd.* 1916, Mar., 13.

SNAKE-BITE. *Sir Leonard Rogers, M.D., F.R.C.P.*

G. W. P. Dennys[1] records a list of 53 cases of snake-bite reported in the Central Provinces of India, which he points out demonstrate how difficult it is to form any conclusions regarding the merits of the three forms of treatment hitherto in general use, because the dose of venom injected cannot be proved, the snake is rarely identified, while in but few cases was only one remedy used. He assumes, on the strength of published animal experiments, that Lauder Brunton's treatment by incision and application of **Permanganate Crystals** cannot be of any use unless applied within fifteen minutes of the bite, and therefore excludes all other cases from his analysis. [This is a serious error which materially vitiates his conclusions adverse to that treatment, as animal experiments show that when but little over a minimal lethal dose is injected, many hours may elapse before any symptoms appear, and yet death may result.—L. R.] When recovery did take place in cases in which the Lauder Brunton treatment was carried out within fifteen minutes, he concludes that a lethal dose could not have been injected, which is hardly fair to the method which he thus condemns as useless. In its place he advises the subcutaneous injection of 10 to 20 c.c. of a 1 to 5 per cent solution of **Gold Chloride,** or, when the bite is on the fingers or toes, an injection of ½ to 1 c.c. of a concentrated solution near the snake-bite punctures. In cases treated with **Antivenin** the mortality was 64·1 per cent, and in cases injected within two hours of the bite it was 50 per cent, but after two hours it was 78·95 per cent. It should always be given intravenously in doses of not less than 40 c.c., a ligature having been applied very tightly above the bitten part as early as possible.

Reference.—[1] *Ind. Med. Gaz.* 1915, Dec., 441.

SOLDIER'S HEART. *Carey Coombs, M.D., M.R.C.P.*

Although this subject was treated at length in the 1916 Medical Annual (p. 525), so much attention has been paid to it since that it must be reviewed again. The liability of soldiers on active service to cardiac disturbances is no new discovery, but their exact relation has never been clearly defined. It may be hoped that with our fuller knowledge of cardiology and the embarrassing wealth of material for observation, we shall find ourselves at the end of the war possessed of definite ideas as to the etiology, prevention, and treatment of these disorders.

Symptoms.—These have been graphically described by Sir James Mackenzie.[1] The patients are usually spare, with drawn faces, and marked signs of vasomotor instability—pallor of extremities alternating with redness, or cyanosis on slight exposure to cold. The cardinal symptoms delineated by his assistant, Wilson,[2] are: great exhaustion after effort, breathlessness on slight exertion, a rapid pulse too easily quickened by exercise, and pain over the precordial region or left costal margin. The heart is often a little enlarged, and Mackenzie says there may be œdema of the legs. One of the most

striking and constant features is the mental background of the case, which varies according to the temperament of the patient, but is never normal. Sometimes t is an introspective, brooding anxiety, at others an irritability of temper.

This picture is only too familiar to those who have been handling troops in this and in previous wars. Wilson quotes a description of the symptoms as seen in the soldiers of the American Civil War, and in our own Army it has been a serious cause of disability for the best part of a hundred years. Martinet's[3] account of his cases in the French Army, and Schott's[4] notes on German soldiers, scarcely differ in essentials from those of our own. The present writer has seen cases in raw recruits, in men who have been training at home, in soldiers home from France at every stage of the campaign, and in men from our various Eastern campaigns. The percentage was high in the men from Gallipoli, and in Mesopotamia every other patient had an unduly rapid pulse. As Thorne[5] points out, the condition is not unfamiliar in civil practice.

The *physical signs* vary widely. Almost anything in the shape of a murmur may be heard. The features common to the majority of the murmurs, however, are that they are systolic, soft and short as a rule, and liable to vary with posture and respiration as well as from day to day. The impulse is usually exaggerated, both in area and in force. This feature is aggravated by increase in the rapidity of the heart's action. But it is a mistake to depend much on the physical signs either for diagnosis or prognosis. They vary too much, and may closely simulate those of organic disease.

The *pulse*, it has already been remarked, is rapid. But what is most striking about it is the undue ease with which it is quickened. Boney,[6] for example, describes acceleration from a rate of 80 beats per minute in the lying posture to 156 in the standing position. This rate persisted while the patient stood, subsiding quickly again when he lay down once more. This was in an Indian soldier in France. In a patient of the writer's,[7] an infantryman from France, the pulse was already 132 when he lay down. This acceleration was probably accountable for in large part by the excitement aroused by the medical officer's visit. When he sat up, the rate increased to 156, and when he stood erect by his bed it rose to 192, and he almost fainted. The high speed persisted in this case after the man lay down again. It is the wide variability in the rate of the pulse that is so striking. The pulse, taken at rest, may actually be slow, but even the charted pulse-rates, taken day after day under precisely parallel conditions as far as can be ascertained, show these wide differences (56 to 92, 72 to 100, and so on). Sinus irregularity is common, and there may be extra-systoles.

The blood-pressure is the subject of conflicting statements. Martinet and Wilson speak of it as high, but Schott says it is low. Perhaps Boney's observation, that while the pulse-rate rises with change from sitting to standing, the blood-pressure falls, may have something to do with this discrepancy.

Etiology.—One of the most important questions relative to the military aspect of this malady is, how is it caused? Some writers (Barr,[8] White and Johnson[9]) see in the tachycardia of military service merely a manifestation of hyperthyroidism. Thorne attributes it to alimentary toxæmia. The available facts seem to be as follows. As we have already noticed, men from every battlefield and all kinds of service are affected. The writer found it especially in young infantrymen of slight build. Parkinson's[10] researches place the average age as high as thirty. In almost three-quarters of his cases there was a history of similar symptoms being experienced in civil life, before military training. It seems, therefore, that these men at any rate were predisposed to a cardiac condition which was brought into prominence by some aspect of military training. Meakins, Lewis, and others,[11] in their admirable memorandum ascribe some importance in the production of this predisposition to a history of rheumatic infection, and Parkinson found a history of some conceivably causal infection in earl er life in about a third of his cases. The possibility of a predisposed condition of the heart may therefore be conceded.

The next point to determine is, what is it in military service that brings out this disability? The various factors that have been discussed may be labelled (1) toxic, (2) infective, (3) physical stress, (4) nervous. Neither alcohol nor tobacco can be shown to have much influence in producing this condition. Many of the patients, as Mackenzie remarks, date the onset of their trouble from some infective disease such as diarrhœa. In very few can a definite physical effort be blamed for the onset of symptoms, but the prolonged and unaccustomed exertions of training seem to play a part in some cases. What has impressed the writer is the association of this condition of 'irritable heart,' in both civil and military life, with other signs of nervous stress. Most observers will agree with Mackenzie, that 'soldier's heart' is an evidence of general exhaustion, the circulatory symptoms being but part of the general manifestation. Boney, writing of Indian soldiers in France, says, "The causation is probably to be found in a great complexity of factors, into which the psychology of the Indian, the exposure, shock, and fatigue of the campaign in a climate to which he is unaccustomed, all enter."

To sum up, 'soldier's heart' is due to myocardial inadequacy (congenital or acquired) existing before military service, but brought to the pitch of 'breakdown,' i.e., of symptoms which cut short military service, by the various forms of stress which that service involves.

Diagnosis.—In this connection two problems arise. First, there is the distinction between organic and 'functional' disease; second, there is the early discrimination between the men with cardiac inadequacy and those who are normal. As to the first, it is probable that no sharp line of distinction can be drawn. There are men who get symptoms of 'irritable heart' because some previous infection has injured the myocardium, yet so little that apart from the stress of military service there have been no signs of it. This 'borderland'

type of case presents a slight enlargement of the heart, with a short and often variable systolic bruit at the apex. In doubtful cases of this kind repeated observation is necessary before a final decision is made. If this care be not taken, many a man is sent home labelled 'V. D. H.' who turns out subsequently to have, at most, an inadequate myocardium which is showing a little evidence of the strain to which it has been subjected. This is a bad mistake, as it depresses the man greatly to be told that he has a diseased heart, and this aggravates his symptoms.

Second, how are we to draw a line between the men with 'adequate' and those with 'inadequate' hearts? Some means of testing the efficiency of the heart must be devised. A heart may be said to be efficient if it responds easily and effectively to the extra call which exertion makes upon it. Here there are two points to settle. First, what exertion shall be used as a test? Second, what is the best index of a normal 'cardiac response'? As to the first, Martinet watches the effect of standing up from a lying position (which is rather a test of the effect of posture than of pure exertion); and also flexion of the lower limbs, carefully regulated, and repeated twenty times in succession. Parkinson made his men climb a flight of twenty steps. Meakins, Lewis, and others, working at the Military Hospital, Hampstead, which has been set apart for the study of cardiac affections in soldiers, have selected certain exercises from among those prescribed in the Army Code. Those who are able to carry these out are then tested also with route marches of four miles or more in light or full kit.

As to the best index of 'cardiac response,' three have been proposed by different writers: the presence or absence of dyspnœa, determined both subjectively and objectively; the variation in the pulse-rate and blood-pressure; and the size of the heart as measured by physical examination. Of these three, the last is practically valueless. The other two are neither of them of full value without the other, but the pulse-rate, tempting though it is on account of the ease with which it is examined, is only of importance, in the view of the Hampstead workers and of Parkinson, if considered in conjunction with the expression, colour, and breathing of the man as he comes from his drill. Very rapid heart-rates are to be reckoned as significant, also slow recovery of the pulse from acceleration induced by exercise.

To sum up as to diagnosis, one must label no case as one of organic heart disease unless the signs are quite unmistakeable, or unless, if the case be a doubtful one, it has been subjected to repeated examinations at intervals of some days. Second, the criterion of cardiac efficiency in the 'functional' cases is the capacity of the soldier to undertake certain prescribed exercises without showing signs of cardiac discomfort.

Prognosis.—One might hope for rapid recovery from the distressing symptoms that constitute the clinical picture of 'soldier's heart,' when the patient is removed from the cause, i.e., the stress of active

service. But unfortunately it is not so. At Hampstead, where careful and prolonged supervision of a relatively small number of patients gives the figures a special value, only 18 per cent were discharged as fit for duty, 36 per cent being permanently unfit, and the balance exhibiting various degrees of limited fitness. Parkinson found that, seven months on an average after first invaliding, less than a quarter had returned to full duty. These are disappointing figures, but everyone with experience of the malady will corroborate them. The German physicians have noted the same thing. The reason for this tendency to chronicity lies, in the writer's opinion, in the fact that the process of military exhaustion digs much deeper into the soldier's being than would appear at first sight. With the best will in the world, men exposed constantly to danger, loss of sleep, unwonted physical exertion, and dreary surroundings, cannot help wearing out, and, once worn out, they take a long time to build up again.

Treatment.—All are agreed as to the futility of drugs. Rest in bed tends to aggravate the symptoms in most instances, as it affords the patient endless inducements to the introspection which is so constant and troublesome a feature of these cases. Tobacco excess is to be avoided, but many men are the better for a little smoking. The Hampstead investigators declare the **Graduated Exercises** which they use for discriminating between the fit and the unfit heart to be remedial also, if advanced in their scope *pari passu* with the patient's improvement. The whole weakness of our position in relation to the treatment of this disorder lies in the fact that we are able to do but little to uproot or alter either of the main causative factors—inherent myocardial 'weakness' and war exhaustion. The psychical factor, which falls under the latter heading, is particularly difficult of attack. The writer believes that it is better to transfer a man who is proved to have 'soldier's heart' to home service for a long minimum period, or to discharge him outright. The one plan that will *not* succeed is to keep him dragging on, drifting from hospital to hospital, uncertain as to his fate, and torn by an anxiety the effort to conceal which is no small factor in the aggravation of his troubles.

References.—[1]*Lancet*, 1916, i, 189; [2]*Brit. Med. Jour.* 1916, i, 119; [3]*Presse Méd.* 1915, 433; [4]*Brit. Med. Jour.* (*Epit.*), 1916, ii, 804; [5]*Pract.* 1916, i, 551; [6]*Brit. Med. Jour.* 1915, ii, 638; [7]*Med. Press and Circ.* 1916, i, 400; [8]*Brit. Med. Jour.* 1916, i, 544; [9]*Lancet*, 1916, i, 78; [10]*Ibid.* 1916, ii, 133; [11]*Brit. Med. Jour.* 1916, ii, 418.

SPINAL CARIES. *W. I. de C. Wheeler, F.R.C.S.I.*

Adams[1] discusses caries of the spine treated by **Osteoplasty.** In order of frequency the disease arises in the dorso-lumbar, lumbo-sacral, and cervical regions. In the early stages stomach-ache is frequently complained of, there is a vague pain in the back, and the evening temperature may be raised. Later, muscular rigidity is demonstrated by noting that the normal concavity of the spine is not produced by lifting the legs with the child in the prone position. If ink dots are made over the projection of the vertebral spines, it can easily be seen

that they do not separate normally on flexion of the back. Herpes zoster has occasionally been met with in adults as a manifestation of caries. In describing Albee's operation of introducing a bone-graft into the split spines of the vertebræ, Adams points out—as do Robert Jones and others—that by fully flexing the knee on the thigh the graft can be obtained without turning the patient on his back after preparation of the spinal bed. This simple device simplifies and facilitates the operation very considerably.

Albee[2] gives a report of results obtained by others with the bone-graft operation for Pott's caries. In 299 cases, reported by 33 surgeons, the disease was arrested in 229, in 59 the condition was improved ; 12 cases died—four from shock. Ten surgeons reported that they did not use plaster jackets or spinal support beyond the period of immediate post-operative recumbency. Albee says that in 198 of his cases operated upon, after one year or more, 184 were cured, or rather that the disease was arrested ; 12 died of some intercurrent disease ; in 2 there was improvement. [The application of the graft alongside of the spinous processes, after Robert Jones's method, has given the writer good results in four cases, and the use of a rib as a graft arrested the disease in a child who was suffering from ever-increasing kyphosis in the mid-dorsal region of the spine. One patient died from acidosis a few days after operation.[7]—W. I. de C. W.]

Wolcott[3] points out that the securing of a firm bony ankylosis gives the patient the best assurance against a recurrence of the symptoms. He states that of 642 operative cases, 538 patients were benefited by the operation. Abscesses were present at the time of operation in 28 cases, and paraplegia in 13. Of these latter, there was improvement in 7. Taking all the cases the mortality was about 5 per cent. Those surgeons who deem post-operative support unnecessary are able to report results equal to or better than those who adopted prolonged post-operative treatment. Wolcott concludes :—

1. There can be no reasonable doubt that these operations, in a large percentage of the cases, abbreviate the treatment of tuberculosis of the spine by definitely hastening the curative ankylosis so necessary in this disease.

2. By hastening ankylosis, the likelihood of an increase in the deformity is proportionately decreased, since deformity depends on destruction of osseous tissue, and this in turn depends to a large extent on the duration of the active disease process.

3. These operations are undoubtedly best adapted for treating cases of Pott's disease involving the cervicodorsal, dorsal, or dorso-lumbar regions, since they are probably one of our best means at the present time of preventing the marked degree of deformity which develops in approximately 75 per cent of these cases, if treated only by the conservative method. Ankylosis of several vertebræ in this region is not associated with any serious amount of limitation of motion if unattended by marked deformity. On the other hand, as

approximately 75 per cent of Pott's disease involving the cervical and lumbar regions develop but a slight degree of deformity when treated by external appliances, and since the development of ankylosis of several vertebræ by operation in either of these regions would be associated with marked restriction of motion in a majority of the cases, it would seem best not to be too hasty in advising operation in either of these regions. This applies especially to children.

4. It seems to be the general opinion of the majority of the contributors that the operations should be considered only as one phase of the treatment for Pott's disease, and that post-operative support should be continued until all signs of active disease have disappeared.

Koeher and others[4] compare the old and the new methods of treatment in bone and in joint tuberculosis. Too much reliance should not be placed on heliotherapy, unless supplemented by orthopædic treatment. With reference to other methods, such as brine baths, the quartz lamp, *x* rays, tuberculin treatment. Bier's hyper-

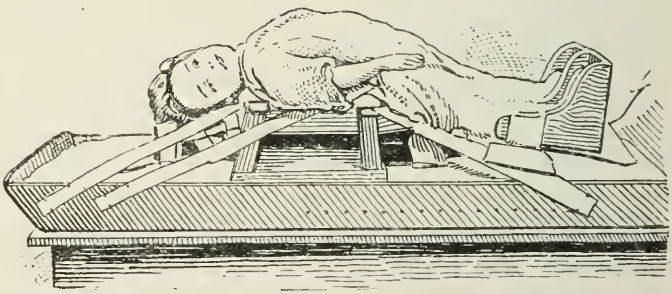

Fig. 107. —The 'wheelbarrow splint,' specially indicated in spinal caries with moderate deformity and much muscular spasm. (*Redrawn from 'The Lancet.'*)

æmia, iodine, and phenol treatment, Koeher thinks that they are not to be compared with **Heliotherapy.** The latter treatment is of course debarred in most cases by its long duration and the amount of money it takes to stay for years at a mountain sanatorium. In such cases radical operation is certainly indicated, such as total excision of bones or a section of joints. Kocher gives pictures of the different forms of local disease. One point of interest is the decrease in the number of cases coming to his clinic in recent years, especially of hip and knee tuberculosis.

Gauvain[5] deals with the correction of deformity in tuberculous disease of the spine and the hip in children. When the disease is acute and progressive the first indication is complete and absolute rest. Mere recumbency is insufficient: immobilization of the spine is essential. To correct the deformity the spinal rigidity must be

overcome and the spine put on the stretch, i.e., gradually hyperextended. For these requirements the wheelbarrow splint[6] is the best appliance (*Fig.* 107).

REFERENCES.—[1]*Clin. Jour.* 1916. 277 ; [2]*Surg. Gyn. and Obst.* 1916, ii, 42 ; [3]*Jour. Amer. Med. Assoc.* 1916, i, 108 ; [4]*Surg. Gyn. and Obst.* 1916, i, 265 ; [5]*Brit. Jour. Tubercul.* 1916, Jan., 12 ; [6]*Lancet*, 1911, Mar. 4 ; [7]*Med. Press and Circ.* 1917, Feb.

SPINAL CORD, SURGERY OF. *J. Ramsay Hunt, M.D.*

Elsberg and Bailey[1] make a distinction between those laminectomies in which the operation relieves pressure exerted on the spinal cord by tumours, by collections of fluid, or in other ways, and those in which there are no evidences visible at the operation of any compression of the spinal cord. Hitherto, all such operations have been grouped under the general term of spinal decompression. Their present paper concerns itself exclusively with the cases in which there is no compression, and in which the exposure itself is the only agency which can account for the change in the symptoms which follows the operation so frequently. The post-operative results have been so striking that the conclusion is unavoidable that surgical exposure of the spinal cord, even in the absence of increased intradural pressure, may of itself effect some change on the spinal cord which benefits or checks the symptoms of certain forms of spinal cord disease ; and they feel that the procedure merits a name to distinguish it from laminectomies which relieve pressure.

Laminectomy and incision of the dura often have an immediate effect on the spinal reflexes. In many cases the knee- and ankle-jerks become markedly depressed, or disappear altogether within thirty minutes of the opening of the dura, and this depression or disappearance of the reflexes may persist from six to twenty-four hours. These changes often affect all the spinal reflexes, whatever part of the spinal cord may have been exposed by the operation. These phenomena might be explained by trauma to the cord during the operation, or by bleeding into the membranes ; but often the diminution or loss of the reflexes occurs when the operation has been very simple, without appreciable injury to the cord itself or bleeding into its membranes. Since a similar change in the reflexes may occasionally be observed after simple spinal puncture, it is fair to conclude that changes in intradural pressure conditions, with resultant modification of the spinal circulation, are the important etiological factors.

The exposure of the cord to atmospheric pressure, and possibly to light, must have a profound effect on the spinal circulation, and, as a result, the irritability of the spinal tissue must be greatly modified. There can be no *direct* effect on the reflex centres (nerve-cells) in the spinal cord, because the changes in the reflexes occur both above and below the part of the cord exposed. For the same reason, the change cannot be due to a direct inhibition of the sensory parts of the reflex mechanisms. We are therefore forced to the hypothesis of an

increased inhibition from the brain centres through the pyramidal tracts.

In addition to the immediate and temporary modifications in the reflexes and motor power just described, there are other changes which are more permanent, and which were observed after spinal operations in which nothing was found to explain the symptoms.

The reports of three cases are given in detail :—

Case 1.—Multiple sclerosis ? Exploratory laminectomy, negative findings, temporary marked improvement in symptoms ; relapse, followed by improvement, and finally complete recovery.

Case 2.—Syphilitic disease of the spinal cord with flaccid paraplegia. Exploratory laminectomy. Very great improvement.

Case 3.—Multiple sclerosis. Exploratory laminectomy : great improvement.

The following conclusions are reached : Free removal of spinous processes and laminæ, with opening of the dura, in the absence of increased intradural pressure or a discoverable lesion, may be followed by a disappearance of normal cutaneous and tendon reflexes for a number of hours, or may be followed by the temporary return to the normal of pathological reflexes. The operation of laminectomy may have a profound effect in certain pathological states of the spinal cord, and may so modify or check the disease that even a return to normal conditions is possible. On account of the relative safety of laminectomy in experienced hands, except in the region of the conus and cauda equina, and for the reasons stated above, exploratory operations should be done more often.

Elsberg[2] discusses the technical features of laminectomy. He has used different methods of approach (curved and sraight incisions—hemilaminectomy, and complete laminectomy, and various instruments—and concludes that the complete removal of the spinous processes and laminæ is the simplest and most reliable method for the opening of the spinal canal.

Experience has shown that, unless the cord has been invaded (as in incision of the cord for the extrusion of intramedullary growths), marked exaggeration of the symptoms of a spinal disease should rarely follow a laminectomy. While all parts of the cord are very sensitive, the conus and origin of the nerves of the cauda equina are especially vulnerable, and after operations in this region, disturbances of the bladder and rectum and of the lower extremities are especially apt to occur.

When a decompressive laminectomy for old or recent fracture of the spine is performed, the surgeon must be sure to take away a sufficient number of spines and laminæ. To remove the arches of the fractured or dislocated vertebræ so as to relieve the compressed cord, or to allow the angulated cord to bulge backward, is not enough. It is usually necessary to take away one or two arches above and below, so that the dural sac has sufficient room to bend backward in a gradual curve.

PLATE XLV.

LAMINECTOMY (CHARLES A. ELSBERG)

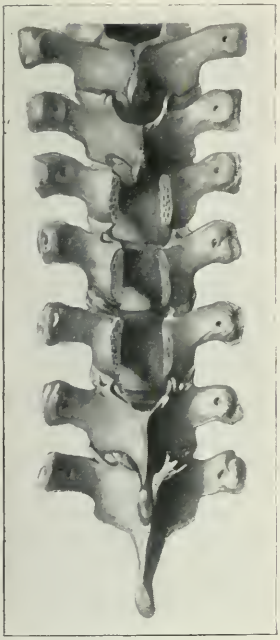

Fig. A.—The amount of bone removed in the operation of laminectomy.

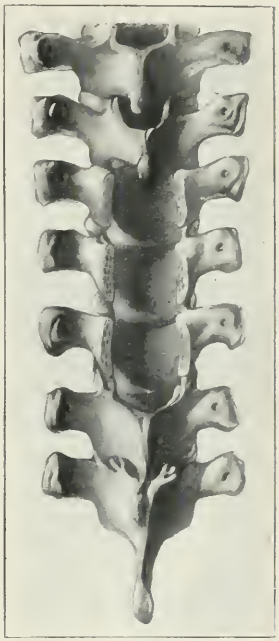

Fig. B.—The amount of bone to be removed in a decompressive laminectomy.

Fig. C.—Method for the exposure of the posterior surface of the bodies of the vertebræ.

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It is often advisable to cut a few slips of the dentate ligament at the affected level of the cord, so as to give the cord a greater freedom of movement. Whenever a disease on the anterior surface of the cord (such as growth) has to be exposed, the manipulations are made more easy by the division on each side of one or two slips of the dentate ligament. If the disease is confined to the outer surface of the dura, it may be possible to dissect off and excise the thick outer layer of the membrane. If this cannot be done, the dura must either be incised and left wide open, or the diseased part be excised. If the dura is left open, the cord should be covered by a piece of Cargile membrane, and the muscles and fasciæ should be united with extreme care.

Properly to expose a spinal-cord tumour, the arches of at least three vertebræ must be removed. If this does not completely expose the tumour, additional spines and laminæ should be taken away, and the incision in the dura extended.

If the tumour is found to be very adherent to the cord, as occurs especially in subpial growths, it is often advisable to leave a small piece of capsule behind rather than to make the attempt to free the tumour from the cord. The danger of relapse if this is done is small, and is more than counterbalanced by the lessened danger of injury to the cord. Several patients, in whom a small part of the tumour capsule was left behind at the operation, have remained well for many years.

The mortality of laminectomy in 150 spinal operations for disease and injury, was 15, or 10 per cent. (*See Plate XLV*).

Gordon Holmes[3] in the Goulstonian Lectures for 1915, reviews his experience with the *spinal injuries of warfare*. He first deals with the pathology of acute spinal injuries; in the subsequent lectures the various symptoms are considered on the basis of three hundred clinical observations.

Pathology of Acute Spinal Injuries.

The spinal cord may be injured directly by the projectile and either completely or incompletely divided. More commonly it escapes direct damage by the missile, and is injured only by displaced fragments of bone, which either compress or lacerate it. Frequently, however, the structural changes can be attributed only to the concussion or commotion effects produced in the cord by a missile which has struck some portion of the vertebra. It is obvious that this classification into direct injury, contusion, and concussion cannot be exact, since contusing or compressing fragments of bone frequently lacerate the cord, while concussion effects are liable to occur when the missile strikes the vertebral column. The macroscopic and microscopic alterations of cord tissue after direct lesions are of the same general character as those which have been described after other destructive injuries of the spinal cord, e.g., the crushed cord of fracture-dislocation. There is disorganization of the neural structures,

with hæmorrhages, softening, swelling of the axis cylinders, fragmentation of the myelin sheath, and accumulation of phagocytes and compound granule cells.

Distant lesions above and below the site of the laceration are not uncommon. Œdema of both grey and white matter, with some swelling and softening of the cord, is the most constant of these changes. The œdema lessens with the distance from the wound, and often seems to bear no definite relation to its severity.

Hæmorrhages of various sizes are often associated, but these are less constant; they are generally small punctiform extravasations of blood, and give a mottled appearance to the cross-section of the cord. The extent of these disseminated intraspinal hæmorrhages is occasionally surprising; in one case they spread over two and a half segments on each side of the wound. They are found with lesions of all regions of the cord; but they are usually most prominent when the cervical region is wounded, and probably least so with injuries of the lower dorsal and lumbar segments. It is noteworthy that large central hæmorrhages with a tendency to spread longitudinally in the cord, such as is generally understood by the term 'hæmatomyelia,' were not present in any of fifteen cases in which the microscopical examination has been completed.

Interesting changes which cannot be directly connected with the trauma, or with the occurrence of these small disseminated hæmorrhages, are frequently found in the nerve-cells and fibres at a considerable distance from the wound. The most striking of these is swelling of the axis cylinders.

Two types of change are seen in the nerve-cells of the grey matter: in the region of the wound they are often shrunken, stain darkly, and present none of the normal details, or if the tissue is œdematous they may be swollen. Some of them break up rapidly, often owing to invasion by neurophages; but when less severe these changes are evidently recoverable. A more common type of change is chromatolysis, with some swelling of the cell-body, excentricity of the nucleus, and disappearance of the Nissl bodies, especially from its centre. Bielschowsky preparations often exhibit irregular swelling of the dentrites of these cells. Examples of the changes found are shown in *Plates XLVI, XLVII.*

Contusion or Compression of the Spinal Cord.—When a portion of a vertebra or a detached spicule of bone is driven into the spinal canal, it frequently lacerates both the cord and the theca, and causes lesions which may differ only in degree from those produced directly by a projectile. Frequently, however, there is no obvious external injury to the cord, and the dura mater is not torn, even though the clinical symptoms indicated a complete transverse lesion. Small hæmorrhages into the meninges are common, however, and on palpation, the cord at the level of the contusion is soft, and if the pia mater is incised or pricked, semi-fluid custard-like material may escape.

When the injury is less severe, the normal appearance of the cross-

PLATE XLVI.

SPINAL INJURIES OF WARFARE

Fig. A.—Multiple hæmorrhages in both grey and white matter, two segments above a complete division of the cord.

Fig. B.—Irregular foci of softening and necrosis in the white matter, two segments above a complete division of the cord.

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PLATE XLVII.

SPINAL INJURIES OF WARFARE—*continued*

Fig. C.—A cavity filled with necrotic material in the left dorsal column, three segments below the level of maximum injury produced by concussion.

Fig. D.—A cavity in the left dorsal column, three segments above a direct injury to the cord. It contains only necrotic detritus. There are also a path of complete necrosis in the left lateral column and areas of partial softening in the rest of the white matter.

section is only obscured, and there are frequently minute hæmorrhages throughout it. The damaged area and the segments on either side are usually swollen by œdema, and the cord may be indented by the indriven bone.

Concussion of the Spinal Cord.—In cases of concussion, when the cord is not damaged by the fracture or dislocation of a vertebra, there may be no external signs of injury, or only a more or less uniform swelling opposite the site of impact, and no definite abnormality may be recognizable even to touch. On microscopical examination the vessels are found engorged, and there are generally punctiform hæmorrhages, especially in the grey matter. The most striking change, however, is the œdematous swelling of the most affected segments, with either diffuse or focal necrosis and softening, which, at least in the cases that have been examined microscopically, has been most pronounced in that part of the cross-section nearest the point of impact. In these areas there may be complete destruction of all the functional elements; but more usually only a proportion of the fibres have disappeared, while the myelin sheaths and axis cylinders of others are swollen.

If these distant and diffuse lesions are compared with those found at the point of impact, it will be seen that they differ from them only in degree; and as they occur whether the cord has been directly injured or not by the projectile or by indriven bone, it is probable that in each case they are due to the same cause, which we must seek in the effects of concussion of the spinal cord produced by a sudden violent impact on the vertebral column.

Spinal Concussion.—The most important and obscure factor is that which we understand by concussion—that is, functional or anatomical disturbances produced indirectly in the spinal cord by a sudden and violent impact on the vertebral column. It is difficult to offer a complete and satisfactory explanation of how a blow on the vertebral column can produce lesions in the cord, protected as it is within the canal. Whatever may be the exact mechanism, it must be admitted that a sudden violent impact on the vertebral column can produce diffuse, irregular, and severe structural changes within the spinal cord.

It has occasionally happened that when the wound is not severe the patient was at first able to perform some movements in his legs, but lost the power to do so within the following two or three days. Further, we have seen new symptoms develop or their level alter under observation. This may be due to a secondary hæmorrhage into the affected tissues or to progressive softening; evidence of both were found in their sections.

Secondary Changes.—The most striking secondary change was the development of cylindrical cavities in relation to the lesion. It seems probable that they originate from the accumulation under pressure of transuded fluid and degeneration products in a small projection of the primary lesion, which tracks upwards or downwards along the lines of least resistance through either normal or œdematous parts.

destroying only a relatively small amount of tissue, but increasing in size, probably under the same prineiples as a retention cyst. The granule-cells which frequently line their walls, or are contained within them, must be due to a reactionary proliferation of the neuroglia in the tissue through which they track.

Clinical Symptoms of Gunshot Injuries.

Localization.—The segmental level of the lesion can be usually recognized as accurately by the extent of the motor paralysis as by the upper border of the sensory disturbance; and since the evidence it gives is less equivocal and as easily interpreted in both military and civil practice, some emphasis may be laid on its importance. The segmental innervation of most of the muscles of the upper and lower limbs is now known, and this knowledge has been applied in clinical work. When one of the lower six dorsal segments is involved, the part and the extent of the muscles of the anterior abdominal wall which are paralyzed form an easy and certain guide to the segment in which the lesion lies. If, for instance, the eleventh is involved, the whole rectus abdominis contracts when the patient raises his head, attempts to sit up, or coughs; but the iliac regions bulge owing to paralysis of the lower portion of the obliqui abdominis, and their failure to contract can be easily recognized by the observer's fingers. Similarly, if the ninth segment is injured, it is obvious to the finger that the recti abdominis downwards from about one inch above the umbilicus do not contract, but are, in fact, passively stretched by the tension produced on them by the shortening of the upper segments. Owing to the same fact, the umbilicus rises towards the xiphoid. The state of the intercostals is an equally reliable guide to the level of the injury, and permits a local diagnosis in the upper as well as in the lower dorsal segments. If the fingers are firmly placed in series on the intercostal spaces, the unaffected muscles are felt contracting on each deep inspiration, and form a firm shallow floor to the space, while in paralyzed spaces no contraction can be felt, and on deep inspiration the finger sinks deeper between the ribs; in lean subjects this may be, in fact, visible to the eye. As the intercostal muscles have only unisegmental innervation, and as each receives its nerve supply from the correspondingly numbered dorsal root, the highest space which is paralyzed indicates the level of the spinal injury.

The upper limit of disturbance of sensation is the means most commonly used in civil practice to determine the segmental level of the spinal lesion, and if proper care is taken, the evidence it gives is reliable. The disturbance in the appreciation of vibration may be also a valuable indication of the level of the injury, especially in incomplete cases in which the dorsal columns only are damaged and sensibility to touch and pain is unaffected, since the vibrations of a heavy tuning-fork cannot then be recognized below the corresponding segmental area. This can be determined by drawing the base of the vibrating fork upwards over the soft parts. This method is

particularly valuable on the trunk when the state of the other elements of sensation conducted through the dorsal columns cannot be investigated; the base of the fork may be simply drawn over the anterior abdominal wall till the level is reached at which the patient feels the vibrations; but as the thorax can act as a sounding-box and transmit the vibration widely over it, it is necessary to apply the fork here only to folds of skin raised gently between the observer's fingers and thumb.

Reflexes and Reflex Tone.—In all severe lesions the lower limbs are found flaccid at least as early as one day after the infliction of the wound, and within three or four days their muscles become toneless and flabby; if the lesion is complete, or almost so, they remain flaccid and waste gradually; later the atrophied muscles, especially those of the calf and the flexors of the toes, undergo fibrous contracture. In less severe cases the muscles regain tone and the limbs become slightly rigid, generally within fourteen to twenty days.

Except when the spinal lesion is slight, the knee- and ankle-jerks are almost invariably lost at first, and in severer cases remain absent during the period in which they have been able to observe them—that is, in some instances, for as long as six to ten weeks. The teaching of Dr. Charlton Bastian, that these reflexes are permanently abolished in total transverse lesions of the cord, is generally accepted now, and Holmes's experience seems to confirm it.

In less severe injuries the knee-jerks return, but generally not earlier than within two or three weeks. The reappearance of the ankle-jerks is always later than of the knee-jerks; but occasionally ankle-clonus could be obtained while the knee-jerks were still absent or much depressed.

The superficial reflexes, the abdominal and cremasteric, are more easily abolished than the tendon-jerks; in fact, when the lesion lies above the mid-dorsal level, both remain permanently absent as long as there is any obvious motor weakness of the lower limbs.

Spinal Shock.—This state of the reflexes, more especially the abolition of the tendon-jerks and the absence of Babinski's sign, in severe but not necessarily complete anatomical lesions, raises many points of interest. The observations confirm the experiences of physiologists, and show that the sudden isolation of a portion of the cord from the rest of the central nervous system leaves it incapable, for a time at least, of subserving even the simplest reflex.

The unilateral absence or depression of the tendon-jerks in cases of unilateral lesion is interesting, as it shows that their abolition is not due to a state of general shock, or to a sudden gross traumatic injury of the cord, but that it must be attributed to an interruption of impulses that descend through the homolateral half of the cord, which produces a functional depression on this side only.

The inability to elicit reflex movements from the sole in cases of complete transverse lesions must be also attributed to the functional depression, either temporary or permanent, of the isolated segments

of the cord. It has been pointed out that in less severe cases, only flexion of the toes, or this associated with contraction of the hamstrings, is obtained, and that only in less severe or longer standing injuries can the complete flexion reflex be evoked. This we might expect, for, when the activities of the isolated portion of the cord are depressed by shock, the relatively complex mechanisms of commissural and intersegmental association naturally suffer more than the simpler and more rudimentary unisegmental functions. And as the sole, from which the reflex is most easily evoked, lies within the sensory distribution of the first sacral root, and the flexors of the toes and the hamstrings are innervated chiefly by the ventral root of the same segment, the contraction of these muscles on stimulation of the sole can be regarded as a unisegmental reflex; additional segments would be concerned in flexion of the hip and knee and the contraction of the tensor fasciæ femoris and adductors, which are included in the full flexion reflex. Further, in these cases the receptive field of the reflex is much narrowed, and is in fact almost invariably limited to the sole, where the threshold of effective stimulation is normally lowest.

'*Automatic*' *Movements.*—But though the shock effect of these severe spinal traumata almost invariably abolishes or depresses seriously the functions of the isolated segments, in a group of four cases in which the lowest dorsal or highest lumbar segments were involved, 'automatic' movements, such as are observed in certain spinal animals, occurred, and their occurrence can be interpreted only as the result of a reflex over-activity of the isolated segments.

There were constant involuntary rhythmical movements of both lower limbs, which apparently occurred apart from any peripheral stimulation. At first they occurred every four to seven seconds, but their rate later became somewhat slower. They consisted in alternate but not quite regular rhythmical flexion of the knees, with dorsiflexion of the feet, extension of the great toes, and slight flexion and outward rotation at the hips, followed by active extension of all segments of the limb. These alternate flexion and extension movements of the lower limbs obviously represent the rudiments of the lower physiological mechanism of gait, and are very similar to the 'mark-time' or progressive movements seen in the 'spinal' dog; their nature must be the same as these reflex movements which Sherrington has described in the spinal animal. It is interesting that such involuntary reflex movements were observed only when the lesion involved the upper lumbar segments of the cord, and that they occurred in a considerable proportion of all serious injuries at this level. In the only two cases in which the spinal cord has been examined, there was exceptionally little distant disturbance, and the lower lumbar and the sacral segments were almost intact in both. No 'automatic' movements of the limbs occurred when the higher cervical segments were injured.

Nystagmus.—The occurrence of nystagmus has also been described

as a result of lesions in the higher cervical region. This symptom was observed in only three of the sixty-three cases in which the cervical segments were injured, in lesions of the second, fifth, and seventh segments. It was slight and ill-sustained in all three, and disappeared rapidly.

Palsy of the Cervical Sympathetic.—Disturbances of the functions of the cervical sympathetic occurred with lesions of all segments between the second cervical and the second dorsal included; they are referred to in notes on thirty-six cases, and in at least the great majority of these, injury of the sympathetic fibres in the neck could be excluded. The most common and prominent symptom was miosis or, in unilateral lesions, inequality of the pupils; a narrowing of the palpebral fissures in one or both eyes, and some enophthalmos. Ptosis was also frequently observed, and disturbances in sweating on the affected side. In certain unilateral lesions, too, a diminution of tear secretion was observed on the affected side.

Hypothermia.—One of the most interesting types observed was due to injury of the lower part of the cervical enlargement, and was characterized by subnormal temperature, slow pulse, low blood-pressure, and scanty secretion of urine. All the ten patients in whom these symptoms occurred died within eight days after the infliction of the wound, and in all the lesion lay in approximately the same region. The temperature varied in different cases, and as unfortunately a special thermometer to register it was not always available, in four of the ten cases it was lower than could be registered in a clinical thermometer (that is, 36° C. = 95° F.).

In all cases, too, the pulse-rate was very slow, while the temperature remained low, and it increased in frequency as this rose; in one case it was only 22 per minute, and in the others ranged between 30 and 50 per minute till the temperature approached normal limits.

The fourth special symptom was the small amount of urine passed. In one man who lived for forty-eight hours no urine was secreted; another secreted only 20 oz. in three days; a third probably only 8 oz. in four days; while from a fourth, whose temperature varied between 87° and 105°, and his pulse-rate between 40 and 104, only 20 to 25 oz. could be drawn off during the first three days.

The mental state of these patients was another interesting feature. When the temperature was very low, or at least below 85°, they were stuporose or extremely lethargic; but as their temperature rose, this mental lethargy quickly passed off, and they became bright and fully conscious of their serious condition—in fact, their mental state varied directly with their temperature.

Cervical pyrexia and *polyuria* were also observed.

Another interesting observation was persistent shivering of the shoulders, neck, and face, without any rise of temperature or disturbance of the pulse-rate, and without any subjective feeling of coldness associated with lesions of the lowest cervical and upper three dorsal segments. This occurred only in severe injuries of this region and persisted over several days.

Vomiting.—When the mid-dorsal region is severely injured, the abdomen is frequently tense and blown-out, and the patient presents the symptoms of paralytic distention of the intestines. A more striking symptom which is sometimes associated with it, but which often occurs without any objective symptoms of abdominal disturbance, is vomiting. In the larger proportion of the cases in which it was observed, the lesion lay in the sixth, seventh, or eighth dorsal segment. There was a certain similarity to the vomiting of a tabetic crisis. As, in the large majority of cases in which this type of vomiting occurred, the lesion lay in the region of the sympathetic outflow to the stomach, it might be attributed to irritation or disturbance of the function of these fibres.

This very exhaustive study of spinal injuries contains many other observations of great interest, but which cannot for reasons of space be included in this review.

James Collier[1] has also investigated the question of gunshot wounds of the spinal cord. The lesions met with were caused by high-velocity bullets, shrapnel, fragments of shell-casing, and by the concussion of high explosives without any external wound. The cerebrospinal space being an elastic cavity, the increase of pressure caused by the passage of the bullet will be greatest at the site of the track and will decrease in proportion to the distance from the track, but will be greater below the site of passage than above it, because the lower portion of the spinal canal is more closed and therefore less elastic. The damage to the spinal cord, even when the bullet does not touch the cord nor lacerate the membranes, is therefore greatest where the bullet has crossed, but it extends for a considerable distance above and below this. Lesions of the cord are not infrequently found in places remote from the chief seat of injury, which are attributable to this increase of pressure, and these are always more marked in the distal part of the spinal cord. The intracranial effect of this increase of pressure is the immediate loss of consciousness which is sometimes met with, and more often in cervical injuries than in those lower down.

Concussion Lesions.—Severe indirect injuries of the spinal cord may occur from the bursting of high-explosive shells when the back is turned towards the force of explosion, without any external wound occurring, without any detectable lesion of the bones, and even without bruising of the soft tissues. It seems remarkable that the impact of the force of the explosion upon the dorsal surface of the body could be sufficient to produce local spinal concussion and a sharply local lesion of the cord, without any evidence of severe bruising of the skin and soft tissues.

Root Lesions.—Sometimes the lesions produced by projectiles affect the spinal roots after they have left the thecal space to a much greater extent than they affect the spinal cord and thecal contents. This seems to be the case when there has been much fracture and crushing of the bone, and especially in the region of the transverse processes. Such

root lesions are not entirely due to direct injury, for they may be widely spread when the injury is comparatively local. They may result from subperiosteal hæmorrhages and periosteal swelling, which strangle the roots in the intervertebral foramina, or from pachymeningeal hæmorrhage.

Intrathecal Hæmorrhage.—Blood effused into a free thecal space finds its way with the stream of cerebrospinal fluid into the lower part of the thecal space around the cauda equina and lumbo-sacral enlargement, and if massive in quantity may distend that space, causing pressure upon the roots and epiconus, and clotting there may cause such matting and cicatrization as may completely destroy by pressure and evascularization the cauda equina and, if it extend high enough, the lumbar enlargement as well. Smaller effusions, by clotting and the formation of condensing adhesions, may cause local signs of nerve-root involvement.

Plantar Reflex Action.—There may be four consecutive stages in the condition of the plantar reflexes following a transverse lesion of the cord: (1) An initial extensor response; (2) A complete absence of any reflex, or a reduced flexion reflex; (3) The extensor response which, when persistent, is indicative of a less severe lesion, or alternatively of more recovery than the reduced flexion reflex: (4) The normal flexion reflex, which returns when recovery is complete. The condition of the plantar reflex is therefore an index of the severity of the damage to the spinal cord, and an important early indication as to whether recovery is occurring or not.

Contracture is a phenomenon which is intimately associated with the condition of reflex action. In these paraplegic cases there are three conditions of contracture of the feet: (1) The dropped foot with retracted toes. This is the ordinary pes cavus of spastic states —the crystallization of the extensor response. (2) The retracted foot with retracted toes. The calcaneus position is often extreme. The ankle-jerk is always lost and the anterior tibial-jerk marked. An extensor plantar reflex is always present. (3) The dropped foot with dropped toes, the position being similar to that of peripheral neuritis. The plantar reflex is either absent, or there is a reduced flexor response.

In the diagnosis between lesions of the roots and lesions of the central grey matter the following points may be useful: (1) In the cervical region extensive root lesions are only met with when there is severe injury of the bones, especially of the transverse processes and spines, and these are recognizable by deformity, swelling, œdema, and radiography. In the absence of these signs, an atrophic palsy of the arms is probably the result of a central lesion. (2) In central lesions the upper limit of the sensory loss is a line more or less transverse to the axis of the limb—that is to say, the sensory loss is of the 'glove' or 'stocking' pattern, in contrast to the more or less longitudinal limitation which obtains in root lesions. (3) In the cervical region a relative escape of the long columns, or early signs of recovery in these, with severe paralysis of the upper limbs, is in favour of a

root lesion, and may suggest the correct diagnosis at an early stage. (4) In the lumbosacral region the most certain indication is the level of the wound of the spine, if this can be determined with certainty.

Remote Pains are very obstinate in some cases. Their mode of origin is obscure. They may be caused by irritation of the sensory tracts in the region of the lesion ; by meningeal adhesions and matting of the cauda equina by the organization of intrathecal extravasation of blood; or the result of the muscular rigidity and flexor spasms.

Among the rare symptoms which have been described, hypothermia and anuria in cases of cervical lesions and vomiting in mid-dorsal lesions have not come under the observation of Collier. Pyrexia and tachycardia in cervical cases have both come under his notice, as has also polyuria in dorsal cases. There was one remarkable case of cervical shivering. Cervical shivering has been met with in lesions of the lower cervical and the upper three dorsal segments only, and the lesions in all the cases have been severe.

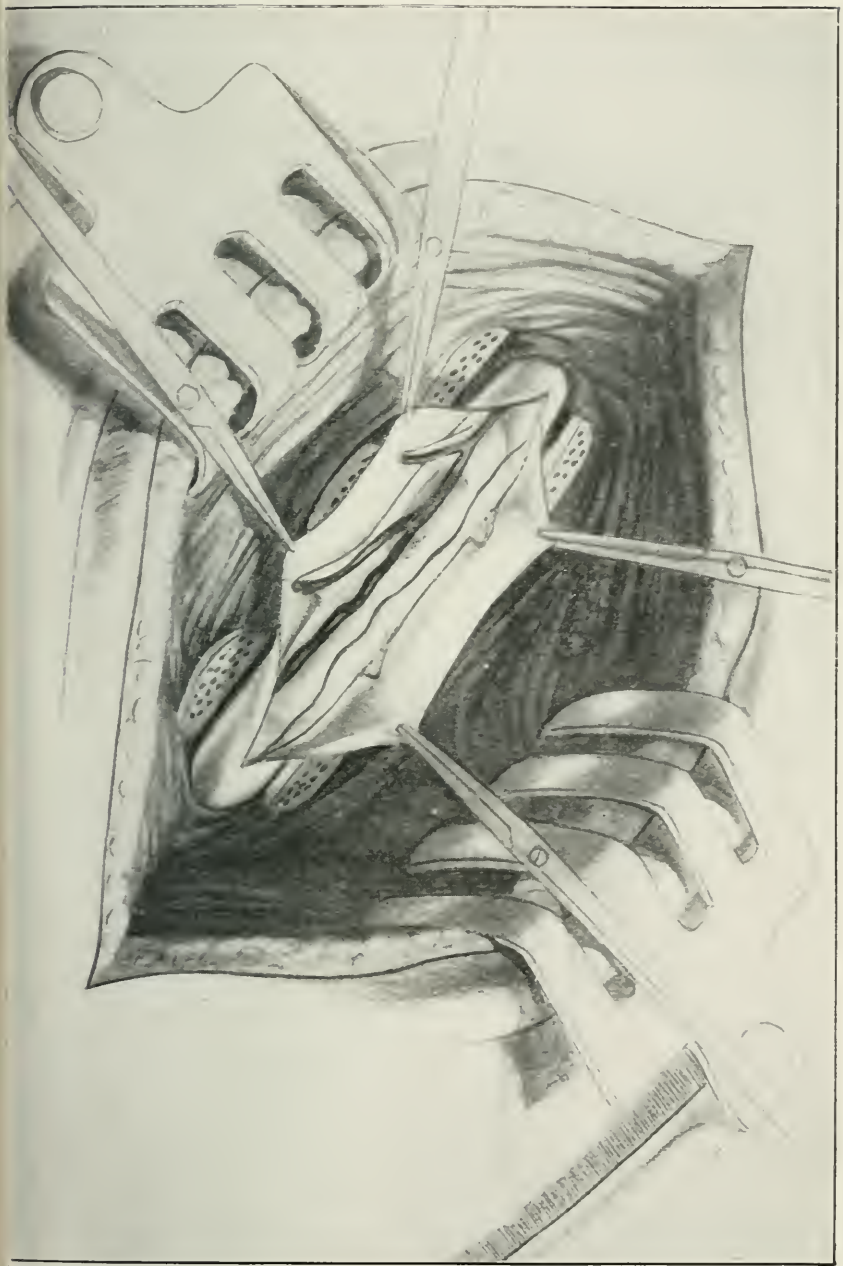
Prognostic Indications.—In nearly all the cases the initial clinical picture is that of a total lesion of the cord, and in the early stages the prognosis will depend upon the condition of the reflexes. The early reappearance of the plantar reflex if lost at first, and the change from the flexor to the extensor type soon after the seventh day, or the presence of an extensor response earlier than this, are certain indications that the lesion is partial and that some recovery will occur. Persistent loss of the plantar reflex and long-lasting flexor response are indications that the lesion is severe and that useful recovery is highly improbable. Early return of the knee-jerk and of the ankle-jerk is of good prognostic import. The further prognostic indications are the date and the rapidity of return of the sphincter control, of sensibility, and of motor power. Early return of sphincter control is one of the best of signs.

Elsberg[5] discusses the *surgical significance of enlarged and varicose veins of the spinal cord.* Among 130 laminectomies for spinal disease, in 6 cases he found one or several enlarged spinal veins on the posterior surface of the cord. In all but one of the patients the enlarged vein ran a straight course; in several instances it accompanied one of the spinal roots to the dural opening. All the patients had the signs and symptoms of a level lesion, and the greatest or only enlargement of the vein was found at the part of the cord which corresponded with the symptoms. Two of the patients suffered from severe root pains, and large veins were found to accompany the affected spinal roots (*Plate XLVIII*).

As soon as the laminectomy had been performed and the dural sac had been incised, the enlarged vein stood out prominently. In all the patients the left posterior spinal vein was enlarged ; it was three to six times the size of the vein on the right side, and sometimes ran an abnormal course. The enlarged vessel sometimes ran underneath or around one or more nerve roots. In one case the vein was very

PLATE XLVIII.

OPERATIVE TREATMENT OF VARICOSE VEINS OF THE SPINAL CORD



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tortuous, so that it could fairly be called 'varicose'; in another, only the branch of the vein which accompanied the nerve root at the level was enlarged. In still another, a branch of the large vessel—itself three or four times as large as normal—entered the substance of the spinal cord near or in the posterior median septum.

In all the patients the greatest or only enlargement of the vein was found at the level of the symptoms, and on the side on which there had been root pains. It is fair to conclude, therefore, that there was some connection between the enlargement of the vein and the cord symptoms. Whether the venous enlargement was the primary condition and the cord disease was secondary, whether the reverse was the case, or whether both played a part in any of the patients, it is impossible to say with certainty.

The discovery of the enlarged or varicose vein was in each instance an operative finding. That the abnormality was not temporary, perhaps due to the exposure of the cord and the change in pressure conditions, was proved by the fact that the spinal vein of the other side always appeared normal in size and position.

References.—[1]*Jour. Amer. Med. Assoc.* 1916, i, 1852; [2]*Ibid.* ii, 168; [3]*Brit. Med. Jour.* 1915, ii, 769 and 815; [4]*Lancet*, 1916, i, 711; [5]*Amer. Jour. Med. Sci.* 1916, i, 642.

SPLEEN, SURGERY OF. *E. Wyllys Andrews, M.D., F.A.C.S. (Chicago).* There is a great revival of surgical interest in the spleen, and a wealth of literature has recently been published.

Injuries.—In trauma and war injuries to the spleen, splenectomy and a gauze pack are reported as giving equally satisfactory results—the latter with less immediate mortality but more frequent later sequelæ. If the abdomen or chest wall is much lacerated and multiple drains are inserted, tamponage is preferable.

Indications for Splenectomy.—In pernicious anæmia the result is nearly always a remission; but the operative mortality, even when the patient's condition is built up by repeated blood transfusions, has been enormous—8 to 30 per cent in various clinics. Certainly no greater percentage than this die in any of the usual sinking periods of the disease under medical management. The remissions after splenectomy seem to be no more permanent than those which are known to take place with no treatment. Splenectomy, therefore, is contraindicated.

In Banti's disease, especially if early, results are excellent. Even in late cases, with marked cirrhosis of the liver and ascites, cures usually result. The mortality is higher with the larger spleens, but without splenectomy the disease is always fatal, and the cause of the disease lies in the spleen.

Hæmolytic jaundice also is primary in the spleen, and is cured permanently by its removal. (Mayo.)

Hanot's cirrhosis of the liver and von Jaksch's disease in children also react well. (Mayo.) Gaucher's form of splenomegaly gives good

results after splenectomy if done early, before the endotheliomatous nodule becomes scattered through the body and vacuolization of the parenchyma of other organs appears.

Leukæmia (myelogenous) may be classed with pernicious anæmia. The lymphatic type cannot be spoken of with so much certainty, because a few have recovered, but may have been of the rare acute type which recovers anyway.

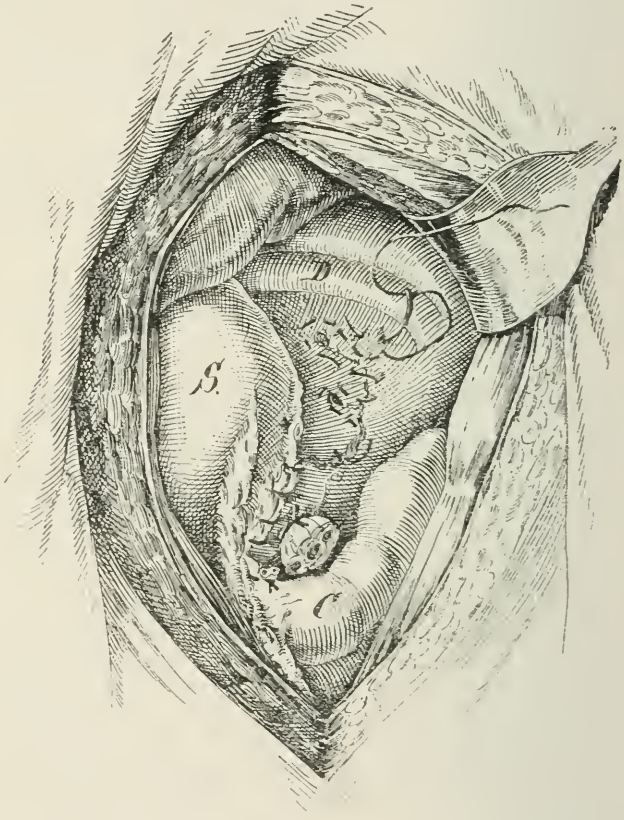

Fig. 108.—Closure of splenic space by snaking catgut suture, to control oozing of blood from deep-seated areas. D, Diaphragm; S, Stomach; C, Colon.
(*Re-drawn from 'Annals of Surgery.'*)

Dawd reports a cavernous hæmangioma splenectomized but followed by metastases all over the body.

Giffin and W. J. Mayo urge splenectomy in chronic syphilitic anæmia with non-gummatous splenomegaly, and report four cases which did not react to antiluetic treatment but cleared up immediately after operation.

Splenectomy is harmless. There is no internal secretion, and there

is an appearance of lymphoid tissue in the liver along the portal vessels afterwards, to compensate, according to Jahlans. Metabolism experiments by Pepper and Austin after splenectomy in man showed no untoward changes.

Technique.—W. J. Mayo and Balfour advocate a left Bevan incision. Percy uses a mid-line incision in order to get a better approach to the gall-bladder, which he usually finds diseased. All writers advise increasing the patient's resistance by blood transfusions before, and if necessary immediately after, operation. Adhesions are loosened by tearing with the gloved hand, the spleen is delivered, and a hot gauze pack inserted behind it immediately to stop hæmorrhage from the raw surfaces. The vasa brevia from the stomach are ligated, and the tail of the pancreas is pushed away by blunt dissection. The pedicle is ligated with or without clamps. The raw surface may be closed by a 'snake suture,' as advised by W. J. Mayo (*Fig.* 108). The abdomen is closed without drainage, unless called for by complications due to the torn adhesions.

The chief difficulties are avoiding injury to the tail of the pancreas and the greater curvature of the stomach. Genter suggests ligation of the splenic artery near the coeliac axis as a preliminary to splenectomy or to produce atrophy. Traell tried this on dogs, and produced marked decrease in the size of the spleen, sometimes with, at others without, infarction, depending on the freedom of anastomosis with the vasa brevia; he also ligated some of these with no harm to the animals. Infarcts are harmless, even large ones. They were not infected by intravenous injections of staphylococci.

References.—*Amer. Surg.* 1916, lxiii, 88; *Ibid.* 1915, Aug., 172 and 177; *Dublin Med. Jour.* 1916, July, 5: *Surg. Gyn. and Obst.* 1916, ii, 1; *Amer. Surg.* 1915, Nov., 530; *Arch. Intern. Med.* 1916, xviii, 131; *Amer. Jour. Med. Sci.* 1916, cliii, 5; W. J. Mayo, *Chir. Med. Soc.* 1916, Oct. 4; *Johns Hop. Hosp. Bull.* 1915, xxvi, 316; *Amer. Surg.* 1915, lxii, 315; *Riforma Med.* 1916, xxxii, 266; *California State Jour. Med.* 1916, xxii, 732; *Arch. Intern. Med.* 1916, xvii, 238; *Jour. Amer. Med. Assoc.* 1916, lxvi, 716; *Amer. Surg.* 1916, lxiii, 122; *Johns Hop. Hosp. Bull.* 1916, xxvii, 1.

SPLENOMEGALY. *Herbert French, M.D., F.R.C.P.*

Gaucher's Disease.—Two fresh cases of Gaucher's disease—a special type of familial splenomegaly—are recorded by Knox, Wahl, and Schmeisser,[1] who also summarize the total sixteen authenticated cases of the malady reported since 1882. The authors give full details of the pathological changes found in the various organs, illustrated by microphotographs. Their paper is a monograph upon the subject; it should be consulted in the original.

Congenital Splenomegaly.—Two further cases of splenomegaly with hæmolytic jaundice treated successfully by **Splenectomy** are recorded by Brewer.[2] Both patients lost their jaundice after the operation, were much improved in health, and were able to do their work without fatigue. One was a trained nurse, 30 years of age, the other a man of 21. A case cured by **X-rays** (p. 49).

References.—[1]*Johns Hop. Hosp. Bull.* 1916, Jan. 1; [2]*Med. Rec.* 1916, ii, 1.

SPRUE. *Sir Leonard Rogers, M.D., F.R.C.P.*

B. K. Ashford[1] deals further with his experience of sprue in Porto Rico, where the disease has long caused a formidable mortality, but has in the last few years made startling advances.

He regards it as a distinct entity, with the four cardinal symptoms of sore mouth, excessive intestinal fermentation, light foamy diarrhœa, and diminution in the size of the liver, for which there is no specific, both yellow santonin and emetine being of little use. It is essentially a disease of towns, being rare in the country, and it affects the well-to-do more than the poor. He associates it with bread, which is only used much in towns in the island. He has made cultures in 197 persons with and without the disease. Among 49 with complete or fairly-marked sprue, all showed monilia, of which 40 gave the cultural characters of a new variety. In 82 cases with present or past gastro-intestinal disturbance not sprue-like, 25 showed monilia, of which 14 belonged to the new variety. In a third group of 66 cases with no digestive trouble, only 4 showed monilia and 2 the new species. Feeding animals with cultures gave disappointing results, although fatal mycosis could be induced hypodermically in small animals. On preparing an antigen from the new species, the complement fixation test gave a positive result in four sprue and a negative one in twelve non-sprue cases. A full description is given of the monilia, which he believes to be the cause of the disease and to be ingested in bread. He confirms all Bahr's conclusions except that he has had no post-mortem experience.

E. J. Wood[2] writes on sprue in the United States, where it occurs in the Southern States and is often confused with pellagra. He thinks the symptoms suggest a deficiency of the pancreatic functions.

E. H. Falconer and A. H. Rowe[3] record the post-mortem findings in a typical case of sprue, in which intestinal atrophy was not well-marked and no monilia could be found either by culture or on microscopic sectioning the tissues.

B. K. Ashford[4] deals with the dietetic treatment of sprue, advocating a milk diet, to which bananas are added and subsequently vegetables, but starches and sugar are prohibited. Finely chopped slightly cooked meat was sometimes also given. In 62 typical cases of the disease, 6 died, 36 were cured (of whom 17 were known to have remained well for from six months to six years); 16 improved, and 4 did not improve.

References.—[1]*Amer. Jour. Med. Sci.* 1915, ii, 680; [2]*Ibid.* 692; [3]*Amer. Jour. Trop. Dis.* 1916, Jan., 400; [4]*Ibid.*, 377.

STOMACH, SURGERY OF.

E. Wyllys Andrews, M.D., F.A.C.S. (Chicago).

In spite of the improvement of technique of *x*-ray diagnosis (*see* p. 38), the introduction of the Rehfuss and Einhorn methods of practical analysis and duodenal-content studies, and work on carbohydrates in the stomach, our methods of diagnosis are, at best

crude. The surgeon should be prepared for any procedure circumstances may suggest when he enters the abdomen.

Gastric and Duodenal Ulcers.—In the past year it has become more and more evident that gastro-enterostomy alone does not give the best results. It will not cure more than 50 per cent of gastric and 75 per cent of duodenal ulcers, according to statistics from numerous clinics. There is, therefore, need of further surgery, and we are faced with the fact that gastrojejunostomy has a mortality of $1\frac{1}{2}$ to 2 per cent, while any further work increases this tremendously, and the most radical procedure—partial gastrectomy—has 25 to 30 per cent mortality. The fact, however, that about one-third of those not cured by gastro-enterostomy develop cancer within five years, coupled with the inadequacy of simple anastomosis, justifies a greater risk.

In duodenal ulcer the pylorus should always be occluded. Ligature with silk or even fascia, which was considered the ideal method, has been proved by experiments and post-operative *x*-ray work to be totally inadequate. Those methods give no permanent closures, and not always even temporary ones. The pylorus should be *cut off*, and either both ends invaginated, or the gastric end implanted in the jejunum, if it is loose enough to be turned down. In an indurated ulcer with chronic inflammatory tumours at the pylorus, a pylorectomy is indicated, because this is the type most prone to malignant degeneration. In ulcers of the cardiac end or fundus, operation is contra-indicated, because experience has shown the falsity of our hopes that quicker emptying and alkaline regurgitation would cure them. Other ulcers we should always try to treat locally, as well as do a short-circuit. Excision, or invagination, or cautery are all recognized as useful.

In *carcinoma at the pylorus*, Panchet recommends the more frequent performance of radical operation, even if it offers little hope of permanent cure. He claims that the patient is more comfortable, that an occasional cure results, that patients live longer, and that greater opportunities for therapy are afforded.

Corner reports three cases of *gastroptosis* cured by Rovsing's operation. Walschild records another. Traell, however, studied some of these cases post-operative, and found no change in the motility or size of the stomach. Behan describes a new operation which he tried on two patients with good results. It consists of taking two or three long narrow flaps of serosa attached only at the greater curvature, and tunnelling in and attaching them more proximally. He also plicates the gastrohepatic omentum.

References.—*Ann. Surg.* 1916, i, 541 ; *Brit. Med. Jour.* 1916, ii, 250 ; *Surg. Gyn. and Obst.* 1916, July, 21 and 23 ; *Presse Méd.* 1916, Aug., 361 ; *Jour. Amer. Med. Assoc.* 1915, lxv, 1021 and 1069 ; *Ibid.* cl, 469 ; *Ibid.* lxv, 1073 ; *Arch. Jour. klin. Chir.* 1915, cvii, 239 ; *Inter. Jour. Surg.* 1916, xxix, 15 ; *Interna. Jour. Surg.* 1915, xxviii, 383 ; *Brit. Jour. Surg.* 1915, Oct., 185 ; *Jour. Amer. Med. Assoc.* 1915, lxv, 1533 ; *Surg. Gyn. and Obst.* 1916, xxii, 379 *Lancet Clinic*, 1916, 203.

STOMATITIS, ULCERATIVE (Ulceromembranous Stomatitis, Acute Infective Gingivitis). (*See also* PYORRHŒA ALVEOLARIS.)

W. H. Dolamore, M.R.C.S., L.D.S.

Under these various terms is described a disease prevalent among the troops in France and elsewhere, and seen among the civil population more commonly now than before the war.

It is frequently, but wrongly, called pyorrhœa alveolaris. It begins as an acute gingivitis, with or without coincident throat affections. The gums are red, swollen, and acutely painful, so that the taking of food is agony. Hæmorrhage is common. With this is associated general malaise and, in some cases, rise of temperature, which in one case known to the writer—that of a schoolboy—rose to 104°, with the coincident constitutional symptoms. If untreated, pus forms, the gum ulcerates and sloughs, a greyish-white thick membrane may form, and even the bone necrose, though this does not occur so frequently as when the disease occurs in children. Here it is said to be sometimes associated with, possibly determined by, the extraction of a tooth or teeth. When pus forms, the usual toxic symptoms are manifest. It is often associated with Vincent's angina. Goadby[1] and Bowman[2] each find the organisms associated to be *Bacillus fusiformis* and spirochætes, both of which have been found by Goadby to penetrate the gum-tissue deeply. The lymphatic glands are enlarged.

There seems evidence to prove that one patient becomes directly infected from another. The civilian female patients often admit "walking out with soldiers." The prevalence among the troops certainly suggests this, but the source of infection is difficult to trace in some cases, e.g., the above-mentioned public schoolboy, who had a clean mouth and teeth in order. Ulcerative stomatitis in children is rarely seen in those with sound teeth and clean mouth; the greater frequency of necrosis in children is probably due to the presence of developing teeth in the jaw-bone, the crypts for which form paths for bacterial invasion, and the crowns of which, being killed by the consequent suppuration, form septic foci.

TREATMENT.—In no case should the removal of roots or teeth be attempted until the acute inflammatory condition has subsided; even tartar is better not removed. In children, swabbing with a solution of **Chlorate of Potash** many times a day soon cures; children use mouth-washes badly. Chlorate of potash can also be given internally; but in a large number of cases no difference could be detected in the rapidity of cure. A grain of **Calomel** is administered at the first visit, and may be repeated if necessary. After the inflammatory condition is cured, roots and loose temporary teeth, etc., are removed. In adults, the use of chlorate of potash as a mouth-wash has also proved efficient in many cases. The gums may also be painted once or twice with **Tincture of Iodine** (2 per cent.) Good results follow the use of **Peroxide of Hydrogen** which, as Goadby points out, is specially indicated, as the organisms found are obligatory anaerobes. Internally, **Chlorate of Potash** and **Iron** can be given. Perchloride of

iron, given internally, has certainly seemed to benefit the local condition, and is frequently indicated by coincident anæmia. Bowman recommends the gums and pockets to be painted with—

R	Vin. Ipecac.	℥½	Liq. Arsenicalis	q.s. ad ℥j
	Glycerini	℥j		

The ipecacuanha is used because of entamœbæ being found, and the arsenic as a spirochæticide. He claims good results from its use.

References.—[1]*Lancet*, 1916, i, 959; [2]*Proc. Roy. Soc. Med.* (Med. Sect.), 1916, 51.

SYPHILIS. *C. F. Marshall, M.D.*

In consequence of the War the number of patients interned in hospital for venereal diseases is much larger than hitherto, and the facilities for comparing the results of the new methods of treatment are consequently greater. The English substitutes for salvarsan—kharsivan, neokharsivan, etc.—are, according to many observers, as efficient as the original German productions. It is gratifying to note that the French preparation galyl, which was produced independently and was not a servile imitation of the German appears to give equally good results, with less risk to the patient. It must be borne in mind, however, that all these arsenical preparations are on trial. It is only their immediate effects which are known; their ultimate result on the disease remains to be seen. Mr. McDonagh's new antisyphilitic preparations—intramine and ferrivine—do not at present appear to justify their employment in preference to those in more general use, and his theories of chemiotherapy have met with somewhat destructive criticism at the hands of expert chemists.

Diagnosis.—Miller, Brush, Hammers, and Felton[1] have studied the diagnostic value of the **Colloidal Gold Reaction** in syphilis of the central nervous system, introduced by Lange in 1912 (*see* Medical Annual, 1914, pp. 189, 190; 1915, p. 193). Their results are briefly as follows:—

1. In the great majority of cases normal cerebrospinal fluid gave no reaction with colloidal gold.

2. The reactions in tabes and cerebrospinal syphilis were not characteristic in either case, but were, as a rule, of the 'syphilitic type,' and hence valuable in confirming doubtful diagnosis, especially when one or more of the other tests are negative.

3. The reaction type in general paralysis was uniform, and gave complete precipitation in the first four to eight tubes. It also occurred in cases where all other abnormalities of the spinal fluid were absent, and may therefore be regarded as specific for this condition. Occasionally it was observed in cases which were clinically syphilitic but showed no signs of G.P.I. A 'paretic reaction' must therefore be regarded as of grave prognosis, for G.P.I. may ultimately develop.

4. In congenital syphilis, with the exception of juvenile G.P.I., the reaction was less characteristic and of less value than the Wassermann

5. In early tuberculous meningitis the reaction was often of the syphilitic type,' and liable to be misleading unless several examinations were made, when there was a gradual transition to the ' meningeal type ' of reaction.

6. In multiple sclerosis the reaction was very similar to that of G.P.I. This is interesting in view of the fact that the cerebrospinal fluid in multiple sclerosis often shows pleocytosis and a positive globulin reaction, and occasionally a positive Wassermann.

7. Comparing the gold reaction with the Wassermann, the authors found that in 252 spinal fluids from cases of tabes, G.P.I., and cerebrospinal syphilis there was never a positive Wassermann with a negative gold reaction, but in four cases the gold reaction was positive while the Wassermann was negative.

8. The colloidal gold reaction does not replace other tests of known value for the cerebrospinal fluid, but in some instances it is more sensitive and more specific, especially in G.P.I. The value of the reaction depends entirely on the use of a reagent suitably prepared and standardized.

The authors conclude that no reaction or group of reactions obtained from the cerebrospinal fluid is pathognomonic of syphilis of the central nervous system, and utter a word of warning against the growing tendency to divorce laboratory diagnosis from clinical observation.

A. C. Coles[2] has devised a new and easy method for demonstrating the *S. pallida*, depending on the fact that structures coloured with a fluorescent dye, such as eosin and fuchsin, stand out prominently with dark-ground illumination. Films may be stained with carbol-fuchsin or Giemsa's stain, but the latter is best if an oil-immersion is to be used. The usual Giemsa solution is diluted with an equal quantity of pure methyl alcohol or acetone. A few drops of this are dropped in the film, and ten times the quantity of distilled water immediately added. Stain for fifteen minutes, wash off stain with distilled water; dry, but do not mount. For greater convenience Coles does away with the oil usually used with dark-ground condensers, and employs an ordinary achromatic condenser provided with a Travis's expanding stop below it. An ordinary paraffin lamp, with or without a bull's-eye condenser, gives enough illumination. A Zeiss or Leitz $\frac{1}{6}$-in. objective with No. 4 or 5 eyepiece is sufficient to detect the *S. pallida*.

The Luetin Test.—Hanes[3] emphasizes the value of the **Luetin Test** in the diagnosis of visceral syphilis. From an examination of 200 cases he concludes that it is more delicate than the Wassermann in latent and tertiary syphilis, that in visceral syphilis a positive reaction is the rule, especially in cardiovascular cases, that the luetin test when positive is absolutely diagnostic, that it is of limited value in other than tertiary cases.

He points out that the size of the dose of luetin employed is important, for if too much is used, non-specific inflammation is produced which, though never typical, may be confusing. The dose is 0·04 c.c. of luetin diluted with an equal quantity of salt solution. Luetin has

been recently manufactured by Parke, Davis & Co. and the Mulford Co. Hanes found these preparations reliable, Noguchi's original luetin being used as control.

Bellomonte[4] has investigated the luetin reaction in congenital syphilis. He found that this reaction was positive in a large number of cases, with or without clinical signs. The luetin reaction gave a higher percentage of positive reactions than the Wassermann, but many cases definitely syphilitic gave a negative luetin reaction, while the Wassermann was positive. In some cases the Wassermann was positive in the parents but negative in the children, when the luetin reaction was positive in the latter. The luetin reaction must, therefore, not be considered as a substitute for the Wassermann, since there are cases which give one reaction but not the other.

The Wassermann Test.—Walker and Haller[5] have made a routine examination in 4000 patients in a general hospital. A positive reaction was given by 600, which included 487 cases of clinical syphilis. The remaining 113 cases which gave a positive reaction comprised 54 with aortic disease, 10 with epilepsy, 10 with hepatic disease, 10 with renal disease, 9 with pneumonia, 7 with diabetes, and 13 miscellaneous. In aortic disease, aortitis with aortic insufficiency was the most common condition, and aneurysm the next. Uncomplicated arteriosclerosis only gave a positive reaction in two cases. Of special interest are the cases of epilepsy, in which the reaction was positive in 10 out of 71 cases, or 14 per cent. These cases were relieved by **Salvarsan** or **Mercury**, showing that syphilis is a frequent cause of epilepsy.

In 32 cases of cirrhosis of the liver there were 6 with a positive reaction, the remaining 4 cases being gummas. In 213 cases of chronic nephritis a positive reaction was given by 10, or 4·7 per cent. This figure does not support the theory that syphilis is a common cause of chronic nephritis. There was evidence of previous syphilitic infection in the pneumonia cases which gave a positive reaction. In 89 cases of diabetes mellitus, 7 gave a positive reaction, or 8 per cent, and in most of these there was a history of syphilis.

Among the miscellaneous cases were three of special interest. Two of these showed symptoms of gastric ulcer; one was operated upon without any definite ulcer being found; the other cleared up under antisyphilitic treatment. The third case was one of colitis, which also cleared up with antisyphilitic treatment.

The authors found that the common infective diseases, such as enteric, scarlet fever, pneumonia, and tuberculosis, have no influence in causing a false positive reaction. As a result of their investigations they conclude that cases of unsuspected syphilis greatly outnumber those frankly syphilitic among patients applying for treatment at a general hospital. The technique employed was the original Wassermann, with the substitution of a 0·4 per cent cholesterinized alcoholic extract of human heart for antigen.

McDonagh[6] is convinced that, in the majority of cases, a positive Wassermann reaction only signifies that the patient has had syphilis

not that he is actively syphilitic, or that he even requires treatment. He has devised a new test, which he calls the 'emulsoid-gelatin' reaction, which depends on the differences in the amount of precipitation in normal and syphilitic serums by the addition of glacial acetic acid and the sulphates of ammonium, lanthanum, or thorium.

TREATMENT.—Major Ffrench[7] describes the methods now adopted at the Military Hospital, Rochester Row. The usual course of treatment consists in four weekly doses of 0·4 gram **Salvarsan** or **Kharsivan,** each being followed next day by an intramuscular injection of 1 gr. of metallic **Mercury** in 5 min. of cream. The latter are continued for another five weeks, making a total of nine injections of mercury and four of arsenic.

The substitutes for salvarsan and neosalvarsan—**Kharsivan, Neokharsivan, Novarsenobenzol,** and **Galyl**—were found to give equally good results. Neokharsivan, arsenobenzol, and galyl were given in concentrated solution in 10 c.c. of distilled water. **Hectine** was also used with success in some intractable cases. **Iodide of Potassium** and **Mercurial Inunction** were employed in certain cases, and a course of iodide was always given in tertiary syphilis along with the routine treatment. McDonagh's intramine (*vide infra*) was used in a few cases, but the results are at present uncertain. As regards the effect on the Wassermann reaction, primary cases almost always gave a negative reaction after two months and remained negative after another two months. Secondary cases gave a higher percentage after two months than after four months. Tertiary cases were mostly positive after both the first and second tests, showing that a positive reaction in tertiary syphilis is seldom converted into a negative after a course of treatment. The earlier the stage of the disease, the higher the percentage of negative Wassermann.

Sixty cases of syphilitic and non-syphilitic venereal lesions were treated locally by the **Simpson Light,** and this was found to shorten considerably the stay in hospital. This light is a powerful ultra-violet ray, which is concentrated on the lesion for two or three minutes three times weekly, at a distance of 12 in. In most cases healing is rapid, especially in phagedæna (*see also* p. 53). Another local application found useful was **Unguentum Rubrum** (scarlet red).

Intraspinal Injection of Mercurialized Serum (*see* MEDICAL ANNUAL, 1916, pp. 548, 558).—In cerebral and spinal syphilis good results were obtained by Byrne's method. The serum is manufactured by Mulford, of New York, and contains $\frac{1}{50}$ gr. perchloride of mercury in 30 c.c. sterilized horse serum. About 30 c.c. of spinal fluid is first withdrawn by lumbar puncture. A rubber tube connected with the ampoule containing the mercurialized serum is then attached to the needle, and the fluid allowed to pass slowly into the spinal canal. Three weekly injections were given. **Potassium Iodide** and **Mercurial Inunction** were given before the intraspinal injections. In a case of advanced tabes with perforating ulcer of foot, the rectal and bladder crises and the lightning pains disappeared and the ulcer nearly healed. Improve-

ment also occurred in cases of myelitis, Charcot's joint disease, and hemiplegia.

Captain McGrigor[8] has compared the *reactions*—rigor, headache, vomiting, diarrhœa, and raised temperature—following the injection of *salvarsan, neosalvarsan*, and *kharsivan* in different quantities and qualities of solution. He finds that these reactions are not much affected by the quantity or quality of the medium used, and that boiled tap water can be used safely instead of distilled water for making the saline solution for salvarsan and kharsivan ; also, that the quantity of the medium used can be considerably reduced : from the usual 250 c.c. to 100 or even 50 c.c. The boiled tap-water is put in a large sterile glass jar ; the clear water is siphoned off from the deposited lime, made into saline solution, again boiled, and filtered through sterile gauze.

H. Spence[9] has tried **Galyl** in a series of 1000 consecutive cases, and considers it equal to salvarsan in clearing up symptoms. As it contains only about half as much arsenic as salvarsan and neosalvarsan, this is interesting in view of the recent suggestion that the activity of these agents is not entirely due to arsenic.* The routine treatment in Spence's cases was three injections of galyl 0·4 gram at weekly or fortnightly intervals, followed by mercury and iodides for two years. The galyl was administered intravenously, either as concentrated solution in 10 c.c. distilled water (in which it is soluble) by syringe, or in more dilute solution by the burette apparatus. No fatality or arsenical intoxication has yet been reported with galyl. In Spence's cases there were only mild reactions.

G. W. Spencer[10] reports the results of intrathecal injections of **Salvarsanized Serum** in seven cases of tabes and five of sclerosis and interstitial cord lesions. In tabes there was generally improvement or disappearance of the lightning pains, but no change in the reflexes or in control of the bladder. In the other cases there was little or no improvement.

A. R. Robertson[11] reports good results from combined intravenous injections of salvarsan or neosalvarsan and intraspinal injections of salvarsanized serum, in eight cases of cerebrospinal syphilis. In cases of tabes the lightning pains disappeared and pupil changes improved. In one case of early tabes the atonic bladder recovered and anæsthesia of the hands and feet improved. In cases of meningitis the headache disappeared and the other symptoms were much improved. In one case progressive nerve-deafness was arrested. In one case of leucoplakia of the tongue (which the author regards as trophic lesions due to syphilis of the central nervous system) the patches disappeared after a single combined treatment. In seven cases Noguchi's butyric acid reaction was diminished, and in six cases the Wassermann reaction became negative.

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* *Vide infra*, Dudley, etc. The percentage of arsenic in these preparations appears to require revision.

Combined Arsenical and Mercurial Treatment.—Fabre and Longin[12] recommend this treatment in syphilis, especially in the armies, with the object of shortening the period of hospitalization and preventing or postponing recurrences. They employ weekly injections of **Neosalvarsan,** commencing with 30 egrams, increased to 75 egrams, administered in concentrated solution of $1\frac{1}{2}$ to 2 c.c. of water. This course lasts for twenty-four to thirty days. In the intervals, mercury is given either in the form of intravenous injections of the **Cyanide** or intramuscular injections of the **Biniodide,** every two days. Treatment is continued afterwards by **Perchloride of Mercury** pills or **Van Swieten's Liquor.** If recurrence takes place, the above treatment is repeated.

The authors point out that each drug counteracts the toxic effects of the other. Thus, the mercury renders the patient more tolerant of arsenic and less liable to the accidents which sometimes follow the use of salvarsan or neosalvarsan alone. In a series of 500 injections they had no serious accidents, and the only reaction effects were occasional headache and nausea. Again, mercurial stomatitis is less liable to occur, owing perhaps to the action of arsenic on the spirilla which appear to be associated with this condition. They regard this as the most active form of treatment for syphilis, and found it effective in rebellious cases of glossitis, palmar syphilides, etc. An apparent clinical abortive cure was more often obtained by this method than by any other.

Morton Smith[13] also recommends combined treatment with **Salvarsan** and **Mercury.** He gives four intravenous injections of salvarsan, with intervals of one, two, and three weeks. The dose is 0·25 mgram per pound body weight, or 0·4 gram for a man of 160 pounds. Mercury is given simultaneously, at first as perchloride by the mouth, afterwards by intramuscular injections of soluble or insoluble salts, or by inunction. Mercurial treatment is kept up for five months, when, if the Wassermann test is negative after a month's cessation of treatment, a rest of three or four months is taken, followed by two or three more months of mercury. Then, if the test is still negative, a longer interval of rest and two months of mercury twice a year for four or five years. In primary syphilis it seems possible to abort the disease by such treatment. If the blood-test becomes positive, the salvarsan injections are repeated. The author gives similar treatment to pregnant syphilitic women, and has had no known case where salvarsan caused abortion. The infants were generally born healthy, but often presented signs of congenital syphilis later, when they were treated by grey powder. Suckling babies appeared to benefit when salvarsan was given to the mother.

The Toxicology of Salvarsan and Kharsivan has been investigated by Willcox and Webster.[14] Willcox found that the English preparation, kharsivan, was practically identical in its physiological and therapeutic effects with salvarsan. Experience has shown that intravenous injections are more efficacious and attended by less risk than

intramuscular injections, which are liable to cause local necrosis and inflammatory troubles. Suspensions in oily liquids are not recommended, as the absorption of the drugs is uncertain. As regards the severe symptoms which may follow the administration of salvarsan, the authors classify these in two types :—

1. *Cases with symptoms of arsenical poisoning*—rigors, rise of temperature, headache, nausea and vomiting, diarrhœa, sometimes injection of conjunctivæ and subconjunctival hæmorrhages, erythema, jaundice, delirium, stupor, albuminuria, and renal casts.

2. *Cases with symptoms of profound toxæmia.*—These are the cases which are usually fatal. Within three days of the injection dangerous nervous symptoms appear—mental aberration, epileptiform convulsions, stupor, coma, collapse, and death. The pupils are often dilated and the reflexes absent. The urine is usually diminished and contains albumin and casts.

The authors attribute these symptoms to auto-intoxication analogous to uræmia. They point out that the symptoms cannot be explained by the liberation of endotoxins consequent on the destruction of spirochætes, because the latent period of three days is incompatible with this idea. Although they make no mention of the more probable explanation that these cases are due to the vasodilator action of the arsenic in the cerebral vessels, with consequent cerebral œdema and encephalitis, they state that arsenic is absent in the central nervous system, and hence that the toxæmia cannot be due to the effect of arsenic. It is, however, possible that the arsenical preparation undergoes some modification in the body which does not respond to the usual tests.

Contra-indications to the Use of Salvarsan.—Renal disease with excretory inadequacy is one. In acute and subacute nephritis, and in chronic parenchymatous or interstitial nephritis there is a risk in giving salvarsan, but in syphilitic nephritis it may be administered in small doses (0·3 gram). Advanced heart disease, with failure of compensation, degenerative changes in the heart muscle, and advanced arteriosclerosis, are other contra-indications. Salvarsan is usually contra-indicated in advanced degenerative conditions of the central nervous system, and in syphilitic meningitis should be used with great caution. In cases of middle or advanced age where there is arteriosclerosis and a positive Wassermann reaction, salvarsan is best avoided unless there is evidence of an active syphilitic lesion. Concerning the intervals between successive doses, the authors are of opinion that four weeks should elapse between the administration of full doses of salvarsan (0·6 gram), since it has been shown by analysis that a full dose is not completely secreted in three weeks ; hence the danger of a cumulative action with shorter intervals. Other observers have, however, given full doses (0·6 gram) of kharsivan at fortnightly intervals with apparently no bad effect.

In the treatment of salvarsan toxæmia, *prophylaxis* is important. An aperient should be given the night before ; alcohol and tobacco should be avoided for twenty-four hours before and after an injection ;

the patient should remain in bed on the day of injection and on the following day ; diet should be light and constipation avoided. When serious symptoms occur, such as collapse, convulsions, stupor, delirium, or coma, an intravenous injection of saline solution, 2 or 3 pints, should be administered, and repeated if necessary. It may also be given subcutaneously. Rectal injections of saline with 3 dr. of sodium bicarbonate to the pint should also be given every eight hours. When the blood-pressure is not low, about ten ounces of blood should be withdrawn. If coma supervenes, the patient must be fed by the nasal tube with peptonized milk. In collapse, strychnine may be given hypodermically and oxygen, or oxygen passed through alcohol, administered. No mention is made of the use of adrenalin, which has been tried with apparent success in severe cases of salvarsan poisoning.

Lucey,[15] from the experience of 600 injections, concludes that **Kharsivan** is quite as potent as the original salvarsan. In 72 per cent there was no reaction, and in most of the others it was slight. In a few cases (0·5 per cent) there was a reaction, due probably to abnormal arsenical toxicity in some samples of the preparation. This appeared a few minutes after the injection, and was manifested by œdema of the lips and eyelids, fullness of the throat, and epigastric pain ; sometimes diarrhœa. These symptoms soon subsided. The usual course given for primary and secondary syphilis was three injections of kharsivan (0·6 gram) at fortnightly intervals, with two weekly injections of **Mercurial Cream** in the intervals.

Dudley[16] compares **Galyl** with *neosalvarsan*, from experience gained at the Royal Naval Hospital, Chatham. The routine treatment consisted in three intravenous injections of one of these at intervals of a month, with three injections of mercurial cream in the intervals. The results were in favour of neosalvarsan, which caused the spirochætes to disappear more rapidly from the lesions and had a greater effect on the Wassermann reaction. The dose of galyl used was 0·4 gram, and that of neosalvarsan 0·9 gram. Dudley states that neosalvarsan, in the form of neokharsivan, as it is now manufactured, contains 31·2 per cent of arsenic as compared with 35·3 per cent in galyl, so that a dose of 0·4 gram of galyl is not quite equal to 0·9 gram of neokharsivan. Hence he suggests a shorter interval between the injections of galyl. However, according to Messrs. Burroughs and Wellcome,[17] who manufacture kharsivan and neokharsivan, the former contains 31·6 per cent of arsenic and the latter only about 21 per cent. Hence any differences in action do not appear to be due to the percentage of arsenic.

Shaw[18] reports good results from the intravenous administration of **Perchloride of Mercury**, commencing with a dose of $\frac{1}{12}$ gr., gradually increased to $\frac{1}{6}$ gr., given at intervals of five to seven days, the number of injections depending on the effect on the Wassermann reaction. The perchloride is dissolved in distilled water without the usual addition of sodium chloride, unpleasant reactions having occurred with the latter solution. The author states that the effects are as rapid as, and in many cases more permanent than, those following salvarsan

or neosalvarsan, and that the perchloride acts in cases which have proved rebellious to these drugs.

McDonagh[19] has introduced some new synthetic preparations for the treatment of syphilis. These are a non-metallic sulphur compound called **Intramine**, and two metallic compounds called **Ferrivine** and **Aluvine**. Intramine is diortho-amino-thio-benzene, and is administered intramuscularly in doses of 1 gram suspended in 9 c.c. of olive oil. Ferrivine is tripara amino benzene-ferric sulphonate, and is administered by intravenous injection of a 1 per cent solution. Aluvine is a corresponding preparation of aluminium. All three are said to be non-toxic. According to McDonagh, salvarsan is superior to intramine in primary and secondary syphilis, but in the recurrent stages the opposite is the case. He also states that in the early stages of syphilis, previous administration of a metallic compound increases the action of intramine, but in the recurrent and late stages intramine increases the action of the metallic compounds. Hence, ferrivine is indicated in early syphilis, but in the later and recurrent stages intramine should be given first. Iodides are also said to increase the action of intramine, and should be given for a week both before and after an injection of intramine. Ferrivine and aluvine act like salvarsan, sometimes more effectively, sometimes less.

As a rule the symptoms of primary and generalized syphilis are said to disappear a few days after the second injection of ferrivine, and the induration of the chancre and papular syphilides within two weeks of a subsequent injection of intramine. In cerebrospinal syphilis intrathecal injections of serum withdrawn after injection of the new preparations is said to be better than salvarsanized serum. McDonagh reports remarkable results. At a recent discussion at the Royal Society of Medicine[20] the new preparations were criticized, by some observers favourably, by others adversely.

The theories on which McDonagh's new chemiotherapy is based are explained in his Hunterian Lectures, which appeared in the *Lancet*, May 13 and 20, 1916. A criticism of these theories by Prof. Bayliss will be found in the *Lancet*, July 29.

References.—[1]*Johns Hop. Hosp. Bull.* 1915, Dec.; [2]*Brit. Med. Jour*, 1915, ii, 777; [3]*Amer. Jour Med. Sci.* 1915, Nov., 703; [4]*Pediatria*, 1915, xxii (*Brit. Jour. Child. Dis.* 1916, Feb., 62); [5]*Jour. Amer. Med. Assoc.* 1916, Feb., 488; [6]*Brit. Jour. Dermat.* 1916, 114; [7]*Pract.* 1916, May, 452; [8]*Ibid.* 462; [9]*Lancet*, 1915, ii, 1292; [10]*Birm. Med. Rev.* 1915, Dec., 157; [11]*Brit. Med. Jour.* 1916, ii, 483; [12]*Presse Méd.* 1916, May, 201; [13]*Boston Med. and Surg. Jour.* 1916, i, 198; [14]*Brit. Med. Jour.* 1916, i, 473; [15]*Ibid.* 614; [16]*Jour. Roy. Nav. Med. Service*, 1916, July, 289; [17]*Brit. Med. Jour.* 1916, ii, 201; [18]*Med. Rec.* 1916, May, 823; [19]*Lancet*, 1916, i, 981 and 1026; [20]*Brit. Med. Jour.* 1916, i, 820.

SYPHILIS, CARDIAC.

Carey Coombs, M.D., M.R.C.P.

Etiology.—An extremely interesting contribution by Symmers and Wallace,[1] based on seventy cases examined post mortem, goes to show that the cases of aortitis we are becoming accustomed to recognize clinically, as well as on the autopsy table, as distinct from

ordinary atheroma, are definitely due to syphilitic infection. There are, however, various predisposing factors which play an important part. Among these they particularly mention physical strain, alcoholism, and intercurrent infections such as acute rheumatism. All these seem to help in determining the syphilitic infective agent to the media of the aortic arch. Of their patients, 80 per cent were men, and 71 per cent were between the ages of thirty and fifty. It seems that aortitis is a late manifestation of syphilis, the interval between primary infection and the beginning of cardiac symptoms averaging over twenty years in their cases. Their experience is that in nearly all cases there are symptoms and signs distinct enough to render a correct diagnosis possible.

Treatment.—Figures like those of Symmers and Wallace relative to the long interval between primary syphilitic infection and the first manifestations of cardio-aortic disease correspond with those of other investigators. These data also harmonize with the fact that syphilis of the heart and aorta more frequently coincides with tabes dorsalis and general paralysis than with any other syphilitic lesion. Another point bearing on the matter is the failure of some workers to find spirochætes in the diseased aortic wall. Some have indeed demonstrated their presence, but others, including Symmers and Wallace, have failed in spite of the most careful and prolonged search. This seems to show that the integrity of the aorta is very slowly destroyed by the syphilitic infection and its toxins. If it is to be successfully treated, therefore, the treatment must begin early. Anders[2] insists on this, especially in such cases as appear to show signs of active cardiac infection during the secondary stage. He advocates the combined use of **Mercury,** preferably by the intramuscular method, with **Salvarsan,** also intramuscularly. The only criterion of success is a negative Wassermann reaction, twice repeated at an interval of two months occupied by mercurial treatment. He is particularly emphatic as to the need for salvarsan in this group of cases.

In the later stage of syphilis of heart and aorta, when definite lesions have developed, the usual measures are applied to remedy the mechanical disabilities inflicted by the infection—rest and digitalis for their particular indications, and so on. As for the direct attack on the syphilitic infection at this stage, Anders uses mercury, with salvarsan in certain cases. It must be realized that there may be an element of danger in the use of the latter, but he thinks it may be given, even in the presence of aortic incompetence, if (1) the myocardium be obviously not degenerated to a large extent, or (2) the patient be so distressed as to be in urgent need of relief. Even where the heart is badly damaged, he thinks salvarsan should be given, in small doses followed by periods of absolute rest, if a prolonged course of mercurial inunction has failed to render the Wassermann reaction negative. He says it should always be given by intramuscular, never by intravenous, injection, and he prefers the old salvarsan to neosalvarsan. **Iodides** are indicated after the active process has been

checked or has ceased, and should be continued so long as progressive improvement is manifest. He finds a dose of 10 or 15 gr. thrice daily, reached gradually from a starting dose of 5 gr., as effective as more massive doses.

PROGNOSIS.—Anders is "thoroughly convinced that the majority of late cases of tertiary cardiac syphilis do not carry a favourable prognosis as to cure; but some degree of amelioration of the symptoms, and prolongation of life in comparative comfort may be confidently expected in the majority of cases." In this connection it is interesting to note that one of Symmers's autopsy cases was that of a medical man who had been thoroughly treated for three years following his primary infection, yet the aorta showed numbers of saeculated aneurysms, and from origin to bifurcation was an exquisite example of syphilitic aortitis.

REFERENCES.—[1]*Jour. Amer. Med. Assoc.* 1916, i, 397; [2]*N.Y. Med. Jour.* 1916, i, 866.

SYPHILIS OF EAR. (*See* EAR, SYPHILIS OF.)

SYPHILIS, INHERITED. *Frederick Langmead, M.D., F.R.C.P.*

The pathological mental phenomena met with in subjects of this disease have attracted considerable attention since the Wassermann reaction has been found to be frequently present in mentally defective children, even though they show no luetic stigmata. J. H. Bazeley and H. M. Anderson[1] have carried out an investigation into this subject among the inmates of the Psychopathic Hospital, Boston, U.S.A. Sixty congenitally syphilitic children, whose average age was 10·3, were compared with sixty non-syphilitic. Of the 60 accounted syphilitic, 43 gave a positive Wassermann reaction (41 of the serum and 2 of the cerebrospinal fluid); in 26 of the 43 there were also the stigmata of the disease. Of the remaining 17, 12 showed stigmata and 5 were considered syphilitic from the family history.

To compare the mental development of the children in the two groups, Binet's test was used. The deficiency among the syphilitic children was 4·1 years, that among the controls 3·3 years. According to school grading, there were 36 cases of backwardness among the affected children, and 24 cases among the unaffected.

The kinds and degrees of mental deficiency were next compared, and the results obtained were as follows:—

	Syphilitic	Non-syphilitic
Feeble-minded ..	29	25
Retarded	19	12
Defective	4	7
Normal	6	14
Supernormal	2	2
	60	60

Consideration was also given to defects of sense organs, since these may influence mental development. Nine of the syphilitic children, but none of the non-syphilitic, had defective speech. Vision was below normal in 5 syphilitic children and in 2 non-syphilitic, whilst the number of examples of defective hearing was equal in the two groups, being 3 in each. The syphilitic children appeared also to be more liable to plural defects of sense organs.

The investigation dealt also with the children's powers of receptivity, imagination (under which were included also memory, analytical ability, learning ability, planning ability), affectivity, and thought. The results obtained were :—

	Syphilitic	Non-syphilitic
Receptivity defective in ..	25	16
Imagination ,, ..	22	19
Affectivity ,, ..	24	29
Thought ,, ..	19	17

Again, plural defects were more common in the syphilitic.

Delinquencies were treated under three headings, individual, and those relating to property and to society. Individual delinquencies were possessed by 32 syphilitic children, as compared with 21 non-syphilitic. Delinquencies relating to property, however, were found rather more frequently among the non-syphilitic, whilst social delinquencies, such as disorderly conduct, contentiousness, assault, etc., were equally distributed among the two groups. Several delinquencies in one individual were often met with among the syphilitic children.

These observers noted that there was a marked contrast between the children born before and after the syphilitic infection of the parents, the former showing normal mental development, the latter under-development with early deterioration.

Alfred Gordon,[2] writing on the same question, states that every case of mental abnormality in children should be investigated from the standpoint of hereditary syphilis. When gross changes in the nervous system result from the disease, treatment is vain ; but when there is only feeble-mindedness of various degrees, and when this is associated with epilepsy, tremors, or choreiform movements, or frequent and persistent headaches, or where there are such neurotic phenomena as outbreaks of anger, of violence, or a tendency to vicious habits, encouraging results may be obtained. In 78 cases comprising idiots, imbeciles, and feeble-minded, both with epilepsy, petit mal, headaches, and without functional disorders, the Wassermann reaction was positive in 50 per cent.

A negative Wassermann reaction should be followed by repeated tests at intervals, a positive reaction by vigorous and prolonged treatment by antisyphilitic remedies. Children up to the age of five were given **Mercurials** and **Iodides**. From that age onwards the treatment

PLATE XLIX.

INHERITED SYPHILIS

Symmetrical syphilitic synovitis of the knee-joints in a little girl who had also interstitial keratitis, Hutchinsonian teeth, and chorea. (A case recorded by the late Mr. Clutton.)

By kind permission of 'The Boston Medical and Surgical Journal.'

PLATE L.

INHERITED SYPHILIS *continued*

Radiograms showing the femora and one tibia from a case of symmetrical synovitis of the knees.

By kind permission of 'The Boston Medical and Surgical Journal.'

was preceded by **Neosalvarsan.** The intraspinal injection of salvarsanized serum was used exclusively for children of fifteen and sixteen years, and was also supplemented by mercury and iodides. The cases with organic changes were unresponsive, but the feeble-minded were decidedly benefited. In some, the epileptic attacks diminished or ceased, particularly when of the minor form, and the mentality showed great improvement. The greatest successes were met with in the feeble-minded with no functional disturbance.

Abner Post[3] considers that the symmetrical synovitis of the knees described by Clutton in 1886 is comparatively frequent, but is usually overlooked because the joints are seldom fully distended, are painless, and are little affected as regards locomotion. The joint surfaces are not injured, and recovery is usually perfect. Local treatment of the knees is unnecessary. Treatment by mercury or potassium iodide, sometimes aided by salvarsan, produces a gradual improvement, but the effusion can often be detected many weeks or even months after its onset. (*See Plates XLIX, L.*)

In a subsequent paper[4] the same writer suggests that occasionally the scars about the lips are due to intra-uterine syphilis, and either the marks of prenatal ulceration or congenital defects of development. He deplores the frequency with which nasal obstruction following 'snuffles' is operated upon for adenoids, an operation which is not only useless but is dangerous to the surgeon, and mentions two examples of infection of the operator's finger. Apart from infantile pneumonias, he recognizes a chronic condition of the lung as part of the disease. It produces consolidation, and resembles closely chronic tuberculosis. Although difficult to diagnose, it should be suspected in an unusual case of apparent tuberculosis when the Wassermann reaction is positive and tubercle bacilli cannot be found.

Treatment.—Veeder and Jeans[5] record their observations on a series of 73 cases, in 41 of which **Neosalvarsan** was used in combination with **Mercury,** and in 31 of which some form or forms of mercury were given alone. The neosalvarsan was injected intravenously by means of a glass syringe into the median or external jugular vein, the doses being 0·075 to 0·15 grm., according to the size of the infant. Neosalvarsan caused a rapid disappearance of the syphilitic lesions, especially of the cutaneous syphilides and the rhinitis. It was more rapid in its effect than inunctions of mercury, and much more so than grey powder. In their opinion the ideal method of treatment is by two injections of neosalvarsan with a three-day interval, followed by a series of courses of grey powder (gr. $1\frac{1}{2}$ t.i.d.), each of a month or six weeks' duration, with an interval of from ten days to weeks between the courses. These should be continued well into the second year, or until the Wassermann is persistently negative. When neosalvarsan is not available, it may be replaced by a course of inunctions of mercury (gr. 10 to 15 daily).

The Wassermann reaction may persist in spite of intensive treatment. This is especially true in cases of 'late' hereditary syphilis,

in which condition they have never met with a persistently negative reaction, despite prolonged active treatment. A negative reaction persisted in some of the 'infantile' cases, however, which according to present knowledge must be considered cured. In the majority it appeared that the infection had become quiescent, all the lesions disappearing but the reaction remaining positive. Time would show whether in such cases the treatment had been sufficient.

Other experiences are reported by Schalek.[6] He advocates strongly the treatment of infected pregnant women with mercurial injections, iodides, and salvarsan intravenously administered. Small doses of the last should be employed in the earlier months of pregnancy (0·2 to 0·4 grm.). The total amount of the drug given should be at least 1·5 grm., whilst larger amounts are surer. Of 128 women with latent lues, who were treated with mercury and iodides, 88 per cent gave birth to healthy babies, but the effect of mercury, unless long continued, is fleeting.

To the apparently healthy child with negative Wassermann and luetin reactions, but born of syphilitic parents, it is well to administer **Mercury.** For the injection of neosalvarsan, Schalek selects either the jugular vein or, for children under two, the veins of the scalp, and advises that the first dose should be a small one. Neosalvarsan, he considers, has a greater field of usefulness in hereditary syphilis than has salvarsan, since it can be given in higher concentration. Mercury is also valuable, but cannot be given intramuscularly. He recommends inunction for six days in every week, or, in the case of very small children, **Perchloride Baths.** Twenty or thirty grains of perchloride, mixed with an equal quantity of ammonium chloride, should be used. Oral medication he regards as unsatisfactory, and considers iodides useless unless accompanied by mercury or salvarsan.

References.—[1]*Boston Med. and Surg. Jour.* 1915, ii, 952; [2]*Arch. Pediatr.* 1916, xxxiii, 273 (*Dublin Med. Jour.* 1916, July, 140); [3]*Boston Med. and Surg. Jour.* 1915, ii, 941; [4]*Jour. Cutan. Dis.* 1916, ii, 589; [5]*Amer. Jour. Dis. Child.* 1916, Mar. (*Ther. Gaz.* 1916, 492); [6]*Urologic and Cutaneous Rev.* 1916, Jan., 373 (*Ther. Gaz.* 1916, 373).

SYPHILIS OF THE SKIN. (*See* Skin, Syphilis of.)

SYPHILIS IN WOMEN. *W. E. Fothergill, M.D.*

G. Gellhorn and H. Ehrenfest[1] devote a long article to "syphilis of the internal genital organs in the female." After three years' work, they find that very little is definitely known about the subject. They have collected 147 recorded cases, and describe 18 new cases of their own.

The authors throw doubt on the assumption that syphilis is more common amongst men than amongst women. They give a useful warning against jumping to the conclusion that when a woman is syphilitic, any physical signs and symptoms she may present must be caused thereby. Tabes and paresis are shown to be much less frequent in affected females than in affected males. It is suggested that

the female genitalia possess "a sort of relative immunity." The authors regard it as proved that a woman may be infected by the seminal fluid of a man though there is no lesion on the penis.

"In a given case, a final diagnosis cannot be made from the histological picture alone without the history and the corresponding clinical findings of the case, unless one succeeds in demonstrating the *Spirochæta pallida* in the tissue."

Syphilis of the Vagina.—The writers have not seen a case, primary, secondary, or tertiary. If chancres occur, they give no symptoms and disappear in a couple of weeks. The recorded cases are mostly of doubtful value.

Syphilis of the Cervix.—The primary chancre of the cervix is said to be the best known and most common syphilitic lesion of the internal organs in women. The authors have not seen a case, however, and such lesions do not appear to have any truly characteristic aspect. They found eight instances of secondary manifestations on the cervix in 400 syphilitic women. These cases showed either macules, papules, or ulcerations—probably three stages in the development of the lesion. There are no symptoms, and healing is quick and leaves no trace. The authors found tertiary lesions of the cervix in six cases, the essential form being a gumma which generally undergoes necrosis and ulceration. Healing may occur spontaneously, and is rapid under general treatment; local treatment is useless. The diagnosis and differential diagnosis of these lesions of the cervix are well and fully discussed, but when all is said it appears that nothing is certain unless spirochætes are found. The diagnosis is no doubt simple enough when there are history, other clinical manifestations, and results of treatment to go by.

Syphilis of the Uterine Body.—Primary and secondary lesions have not been proved to exist. A few instances of gumma in the uterine wall are on record. It is recognized that syphilis is transmitted from the mother to the fœtus—not from the father direct—therefore there must be spirochætes in the endometrium of every pregnant syphilitic woman. It is therefore a striking fact that the body of the uterus is probably the most rarely involved (like the prostate in the male) of any of the structures affected by tertiary syphilis. Much has been written about syphilitic metritis and endometritis, but nothing would appear to have been proved.

Syphilis of the Tubes.—"It seems possible that the tubes may be the seat of luetic lesions; but the pathological and clinical material on record is yet too incomplete to permit of positive assertions. Spirochætes have never been found in the tubes of syphilitic women."

Syphilis of the Ovaries.—Enlargement, inflammation, sclerosis, and gumma have been described, but in no instance have the changes been proved to be luetic in origin. Spirochætes have not been demonstrated.

Syphilis of the Pelvic Connective Tissue.—This appears in the form of a diffuse gummatous infiltration. A diagnosis of malignant disease is generally made, but may be corrected by the observation of other

unmistakeable signs of tertiary syphilis. Specific treatment quickly removes the infiltrate.

Syphilis and Metrorrhagia.—Is there any causal relationship between syphilis and uterine hæmorrhage ? The authors consider that bleeding in syphilitic women does not signify the presence of a definite specific lesion. They "believe that syphilis, by the infection of the entire organism, produces in some cases directly or indirectly disturbances in the function but not in the tissue of the ovary, and that these ovarian disturbances cause menstrual disturbances." "Everything points to this : that metrorrhagias, if at all due to syphilis, are caused by disturbed ovarian function, but not by localized lesions."

Infectiousness of the Physiological Secretions of Syphilitic Women.—The authors have repeatedly found, as Grafenberg has done, spirochætes in the secretion from the cervical canal when no lesion was present in the cervix or vagina. Thus it is proved that women may cause infection during the secondary stage in the absence of any lesion.

Though largely negative in results, this is a most instructive and important paper.

Reference.—[1]*Amer. Jour. Obst.* 1916, i, 864.

TENDONS AND MUSCLES, ADHESIONS OF.

W. I. de C. Wheeler, F.R.C.S.I.

If a tendon, for example of a finger, is divided, and the wound heals after a prolonged period without primary suture of the tendon, there is often a marked gap between the divided ends, and loss of function. In such a case it will be found impossible to bring the divided ends together ; but in a number of cases the white fibrous tissue formed between the two ends makes an admirable junction, if it were not for the fact that it is generally adherent to the superficial and deep tissues. Function can be restored in such a case by free mobilization of the fibrous tissue joining the two ends of the tendon, and by transplanting the sheath of a tendon from the foot in order to prevent subsequent adhesions. When removing the sheath from a tendon in the foot, the operation of transplantation at first does not seem feasible. After complete separation, the transplant shrivels up and appears as an insignificant portion of tissue ; but when held out by several pairs of fine forceps it is found to make an admirable and substantial covering for the extemporized tendon. The results of this method are good.

Giuseppi[1] writes as follows about the importance of suture of the deep fascia in order to prevent adhesions of tendons and muscles : We have had a fair number of cases of deformity due to adherent tendons and muscles at the Cliff Hospital, Felixstowe. Most of the scars were situated on the forearm, but some were on the arm or thigh. They resisted all attempts at improvement by massage and movements, and on operation it has been found that in most cases the condition has been due to the failure of the surgeon to sew up the deep fascia after making an incision for the removal of the bullet.

The exposed muscles or tendons become adherent to the skin. The condition can easily be cured by suturing the deep fascia after separating the adhesions, putting up the forearm on a splint in a suitable position, and having recourse to movements and massage some twenty-four hours after the operation. The success attending these steps has been very great. The condition can be still more easily avoided by suture of the deep fascia in every case in which it is opened, following this up by early massage and movements.

Other cases are due to the tendons and muscles becoming adherent in the scar following a wound. The adhesion is, as in the last class, to the skin, and is due to the division of the deep fascia. These contractions can be avoided by early massage and movements, and when the contractions have already taken place, can be cured by similar measures. Too much stress cannot be laid on the importance of suturing the deep fascia in every case in which it is opened by the surgeon.

Improvement in wound scars by means of **Electricity** (p. 54).

Reference.—[1]*Brit. Med. Jour.* 1915, ii, 564.

TESTIS, SURGERY OF. (*See* Epididymis.)

TETANUS. *W. I. de C. Wheeler, F.R.C.S.I.*

The war has again set surgeons investigating the subject of tetanus. The paucity of cases is an index of the success of treatment, and especially prophylactic treatment. Cases of local tetanus provide new material for thought. A soldier may receive a slight wound, say, in the upper arm, and be well in every respect but for the fact that the one limb is affected with tonic spasms. The War Office Committee for the study of tetanus issued an instructive memorandum for the guidance of those responsible for the treatment of soldiers. In about ten days the immunity conferred by the first prophylactic injection is to a great extent lost. A second subcutaneous injection should therefore be given at an interval of seven days. In long-continued septic wounds the immunity of the patient should be made certain by a third and fourth injection at seven-day intervals. Anaphylaxis may be ignored when prophylactic doses of 500 U.S.A units are given subcutaneously. The ordinary vial contains 1500 units; therefore one-third of this should be injected into each wounded man. It is often advisable, if an operation is to be performed on a healed wound, to give a precautionary injection two days before operation. Many cases have occurred where the wound, although healed, was the primary focus for a general attack of tetanus following re-operation. After subcutaneous injections it takes forty-eight hours for the serum to be absorbed. Injected intramuscularly, the absorption is more rapid—about twelve hours.

Oxidizing antiseptics, such as **Hydrogen Peroxide, Permanganate of Potash, Chlorine Water,** and solutions of **Iodine** are unfavourable to the anaerobic growth of the tetanus bacillus; they render toxin non-toxic, and are therefore valuable locally.

In those who have been protected by prophylactic injection, trismus and general symptoms seldom occur; but local spastic rigidity of the wounded limb may persist for weeks. Tetanus toxin reaches the motor nerve-cells by travelling up the nerves, and is not directly conveyed to the central nerve system by the blood-stream. The motor nerve-cells governing the muscles round the wound will be earliest affected. Hence the spasticity and increased reflex excitability of the muscles near the wound—a valuable guide in early diagnosis. Trismus and the risus sardonicus will of course be recognized by all; but cases of tetanus often manifest themselves early by general restlessness, violent headache, outbursts of temper, stitch in the side, profuse sweats, and difficulty in micturition. Of the antitoxic serum, 5000 units administered early while the tetanus is local are more valuable than 50,000 when the disease is generalized. Once tetanus is diagnosed, the best results are obtained by intrathecal injections of serum. This direct attack on the toxin should be supplemented by intramuscular injection to neutralize any toxin in the blood. Intravenous injections are sometimes followed by anaphylaxis. Cases of trench foot with broken skin are liable to a very violent form of tetanus, and should have a rigid course of prophylactic treatment.

Curative doses must be very much larger than prophylactic doses of serum. If possible, 20 c.c. of cerebrospinal fluid should be withdrawn and 20 c.c. of serum very slowly injected. If the serum used be of the ordinary strength (150 units in 1 c.c.), the patient will then receive a dose of about 3000 units in 20 c.c. At the same time 5000 or 10,000 units should be injected intramuscularly, and about half this amount subcutaneously. The intrathecal injections may be repeated daily for three to five days; the intramuscular and subcutaneous injections are continued daily according to the severity of the symptoms.

It is doubtful if the carbolic-acid treatment is really useful, and the treatment by magnesium sulphate is too doubtful to justify the risks. There is difference of opinion about the effect of radical surgical operations; but it would seem that these procedures are of little avail, and may actually accelerate the course of the disease.

R. F. Bolt[1] describes a case of trismus and other symptoms of tetanus occurring in an R.A.M.C. officer doing duty at a casualty clearing station. The patient pricked his right index finger on March 1, and received on March 3 a dose of 18 c.c. of antistreptococcus serum in the right flank. Symptoms of serum sickness arose on March 14, including an urticarial rash. Two days later there was pain in the neck, back, and limbs, with stiffness in various muscles and rigidity of the limb on the side of the initial injury. Trismus and sweating quickly followed. On March 19 the patient was practically well. The diagnosis was serum sickness, and no antitetanic serum was administered.

REFERENCE.—[1]*Brit. Med. Jour.* 1916, ii, 218.

THERMOMETRY, CLINICAL. (*See* Clinical Thermometry.)

THORAX, PENETRATING WOUNDS OF. *Lewis A. Conner, M.D.*

The past two years have offered many opportunities for the study of penetrating wounds of the chest, and the information which has been gained thereby has been quite different from that obtained in previous wars. One of the most striking features is the lack of correlation between the degree of anatomical damage and the severity of symptoms. A large number of patients are admitted complaining of comparatively trivial symptoms, although the course of the projectile would indicate a comparatively great amount of damage to the lung tissue. On the other hand, death may occur promptly although examination fails to reveal any very extensive injury.

W. H. White[1] reports several instances of bullet wounds where the man did not realize for some time that he had been hit, and many who were able to return to active service within four or five months. Rose Bradford and T. R. Elliott[2] point out that the results are quite different from those seen in the South African war. High-velocity bullets at short range, or tearing fragments of shell, cause greater laceration, hæmorrhage is generally greater, and infectious material is frequently introduced into the wound from the clothing of the patient, so that infection plays a much more prominent part than it did in 1900. It is difficult to judge of the degree of mortality, for the most severe cases probably never leave the field, and by far the largest number of deaths occur before the patient leaves the base. Nevertheless, the mortality is probably high, and R. D. Rudolf[3] is of the opinion that it is actually higher than in recent preceding wars, though probably lower than in the Crimean and American Civil Wars.

The commonest symptoms are pain, hæmoptysis, and dyspnœa. Dyspnœa is most common and may be very severe. Hæmoptysis is also common, the amount of blood coughed up depending upon the size of the vessels damaged. The severity of the pain varies, but is apt to be more marked if a rib has been injured. Hæmothorax is frequently seen; indeed, free blood in the pleural cavity is probably an invariable accompaniment of perforating wounds of the chest, though the amount may be so small as to escape detection. Very constantly hæmothorax is accompanied by fever, and it is important to recognize that this increased temperature does not necessarily signify the presence of infection. It is no doubt due in part to the absorption of altered blood. Pneumothorax, according to Rudolf, is common, but is apparently not so considered by other authors. It may occur late, and the air may be under greatly increased pressure. Hæmopneumothorax is apparently not frequent. If infection occurs, there is naturally the development of an empyema or a pyopneumothorax. The physical signs are, in the case of hæmothorax, those of fluid in the pleural cavity; those of pneumothorax differ in no way from the signs usually described in that condition. Diagnosis is

usually arrived at by means of aspiration, *x*-ray examination, and a careful eliciting of the physical signs. An extravasation of blood into the parietes has led to an erroneous diagnosis, aided by the presence of hæmoptysis due to bruising of the lung tissue without perforation.

An interesting discussion has arisen as to the extent to which the effused blood coagulates inside the pleural cavity. Bradford and Elliott[2] state that after the fourth day the material removed by aspiration may be a brownish-red fluid which yields a light gelatinous clot and contains lymphocytes and endothelial cells; a deep-red fluid which looks like non-clotted blood, but which yields a heavy deposit of cells on standing, and may not develop the lightest clot; or masses of dark, jelly-like clot, which soon block the needle. It is generally believed that coagulation takes place promptly, and that in some instances the blood is actually defibrinated within the chest by the action of the lungs, so that aspiration reveals thick red defibrinated blood. The mild inflammatory reaction, which is apt to develop in the pleura as a result of the presence of blood, produces a certain amount of fibrinogen, which may lead to the formation of a thin secondary clot outside the body, such as that seen in ordinary serous pleural effusions. This opinion is borne out by the experimental work of Denny and Minot[4] who injected blood into the pleural cavity of animals. After a certain time the chest was aspirated, and it was found that the fluid obtained did not clot and was devoid of fibrinogen. Pure fibrinogen solutions, when treated in the same way, showed no diminution in the amount of fibrinogen, and even tended to clot more readily than the controls. They conclude therefore that coagulation and defibrination had taken place.

Injury of adjacent organs, such as the liver and heart, leads to complicating conditions that may in themselves determine a fatal issue. The prognosis is rather difficult, but it may be said that most of the deaths occur during the first three weeks after the wound is received, and that the occurrence of infection or extensive hæmothorax is of distinctly bad import. Denéchau[5] feels that it is unusual to find an instance of complete recovery from these wounds. Pain may persist for a long time and, though rarely severe, may be troublesome. Dyspnœa on exertion is perhaps the most constant sequela, and it is generally possible to demonstrate with the *x* ray a loss of motion in the corresponding half of the diaphragm. The symptoms are, as a rule, perfectly compatible with an active life. The presence of a projectile in the chest is often well tolerated, though sometimes accompanied by periods of pyrexia and suppuration, which may be followed by expulsion of portions of the foreign body. Removal of the projectile often gives marked relief.

Treatment.—For the first few days the patient should be kept quiet, to permit the hæmorrhage to cease and to prevent any disturbance of the bleeding area. In severe hæmorrhage, Don[6] is of the opinion that the only effective treatment is the rapid production of a

complete **Pneumothorax,** and he recommends a stab wound with a knife in an intercostal space and the insertion of a tracheotomy tube to maintain the opening until the hæmorrhage has ceased. The tube is removed after twenty-four or forty-eight hours, and the wound allowed to close. In the average case it is wisest to delay aspiration until the sixth or seventh day, in order to permit the blood-clot to contract somewhat. Massive coagulation of the fluid is said to be unusual. Small amounts of fluid may be left undisturbed.

J. L. Menzies[7] emphasizes the importance of bacteriological examination of the aspirated fluid, since the presence of an infection may be discovered only in this way. In the presence of empyema, of course **Thoracotomy** is indicated. It is said that there is but slight danger of reopening the wound in the lung during the aspiration of fluid; but if thought wise, it is possible to replace the fluid with oxygen or air at the time of aspiration, and this practice may enable one to remove a much larger amount of fluid with less discomfort to the patient. It is recommended that as much as possible of the fluid be removed. Projectiles lodged in the chest demand removal only if they cause symptoms, either because of infection or from their mere presence.

Villéon[8] operates directly under the fluoroscopic screen, and has removed fifty-eight projectiles from the lungs of fifty-one wounded, without mortality and with excellent results. When such foreign bodies produce little or no trouble, it is probably better to leave them alone.

References.—[1]*Lancet*, 1915, ii, 1233; [2]*Brit. Jour. Surg.* 1915, Oct., 247; [3]*Quart. Jour. Med.* 1916, ix, 257; [4]*Amer. Jour. Physiol.* 1916, xxxix, 455; [5]*Presse Méd.* 1916, xxiv, 329; [6]*Brit. Med. Jour.* 1916, i, 816; [7]*Brit. Jour. Surg.* 1916, April, 667; [8]*Presse Méd.* 1916, xxiv, 300.

THROAT AND EAR, WAR NEUROSES OF.

J. S. Fraser, M.B., F.R.C.S.

O'Malley[1] states that the chief neuroses of the throat and ear met with in the present war are the following: (1) Functional aphonia: (2) Mutism; (3) Loss of volitional coughing; (4) Functional deafness.

(1) In functional aphonia, vocal sounds are absent, the larynx is passive; but whispering, which is produced by the resonating cavities of the pharynx, mouth, and nose, remains. (2) In mutism, both vocal and whispered speech are absent, the larynx and resonating cavities being passive; but the patient may make lip and facial movements as if attempting to speak. (3) Coughing is partly under the control of the will and partly involuntary, the latter being a purely protective reflex act. It is the voluntary side of the function which is absent as a neurosis, frequently in association with functional aphonia. Aphonia alone is the commonest of these neuroses; aphonia with loss of volitional cough comes next, mutism being still rarer. (4) Deafness alone is rare, but mutism with deafness seems to be the least frequent of all. Cases of laryngeal neuroses were decidedly more common in the winter and spring than in the summer and autumn

Hearing is one of the special senses, and must be regarded mainly as a protective function. Equilibration, which is intimately associated with hearing, is never disturbed in cases of functional deafness. Hearing is also a more highly specialized function, and appears later in the zoological series than equilibration, and is in consequence more prone to neurosis than the latter. Speech is a volitional motor function, the emission of impulses originating in the sensorium. The power of speech cannot be exercised until the efferent projection fibres and the association fibres of the brain have undergone myelination, and the auditory and visual word centres have stored up the memory of words. Functions which are primarily protective, and which appear earlier in the scale of evolution, and are not dependent upon voluntary control, are less easily disturbed than a function which is largely dependent upon will and memory and has appeared late in the zoological series.

Starr believes that reflex neuroses are due to defective central control, and not to peripheral irritation. O'Malley holds that peripheral irritation may not only set up reflex stimuli which are capable of inciting inhibition of the voluntary over the reflex centre, but, vice versa, that normal stimuli to the reflex centre may again induce the voluntary to exercise its proper function over its associated reflex centre. For example, the act of swallowing consists of three stages: the first from mouth to pharynx (voluntary), the second from pharynx to œsophagus (partly voluntary), and the third from œsophagus to stomach (purely reflex). The usual treatment consists in passing a bougie beyond the voluntary and partly voluntary to the reflex region. The instrument then passes with ease, and the power of swallowing is restored. O'Malley suggests that this is due to the direct physical response to the excitation of associated nerve paths, whose co-ordination is temporarily in abeyance. The lower or reflex centre, being stimulated, conveys the stimulus to the higher or controlling centre, and rouses the function of the latter into activity.

The sole aim of treatment is first to excite involuntary coughing, or surprise laryngeal sounds over which the patient has no control. The larynx is examined in the usual way, and the patient is then requested to say 'e' or cough: if the cords do not approximate, they can be made to do so by applying moderate friction on the fauces and pharynx, with the laryngeal mirror, to excite secretion. The latter begins to drop into the larynx and acts as a foreign body, a protective reflex being at once excited, which adducts the cords to prevent the secretion from entering the trachea. At the same time an involuntary cough is produced to expel the mucus, and if the friction and flow of secretion are maintained and the patient is urged to cough vigorously, voluntary coughing and a tendency to retching, with forced laryngeal notes, will rapidly follow. The act of retching causes a wide excursion of the diaphragm with a more pronounced expiratory blast, to be rapidly followed by deeper inspirations. When the explosive sounds accompanying retching have occurred two or

three times, the mirror is withdrawn, the tongue released, and the patient is requested to swallow, take a deep breath, and cough, and then urged to count up to ten.

The treatment of functional deafness consists in exciting the vestibular apparatus as follows. Cold (or hot) water is allowed to flow in a steady stream into the external auditory meatus by means of a tube attached to a receptacle two feet above the patient's head, and continued until he becomes very giddy and an active nystagmus is produced. The end of a speaking-tube three feet long is then inserted in the ear so treated, and the surgeon shouts into the mouth-piece the assertion, "You hear now," and the answer "Yes" comes promptly. The tube is now dropped, and a conversation held as if no deafness ever existed.

Where functional deafness and mutism co-exist, it does not appear to be material which is treated first. Some of the cases diagnosed as shell deafness are partly, if not wholly, functional, and respond to the treatment described above.

Milligan[2] described the case of a man who was 'buried' as the result of a shell explosion. He was removed to hospital in a profound degree of shock. There was complete loss of voice. Milligan said that in several cases there had been great difficulty in restoring the voice. Ordinary methods were tried, such as drugs, a laryngeal brush, and the use of electrodes. When these means failed, the patient was put slightly under ether, and, when he had partially come 'out,' Milligan introduced a laryngeal spatula into his larynx and moved it about. Shouting was the usual result, and the continuance of this was encouraged until the man was quite aware that he was shouting.

Tilley described the treatment of a young woman suffering from functional aphonia. She knew all about the ordinary methods, as she had attended a number of hospitals. She was slightly anæsthetized, and a strong faradic electric current was used at that stage of recovery when she had no control over her voice, and the screaming to which she gave vent was something to remember. The current was applied until she could have no doubt she was hearing her own voice. She retained her voice for some twelve hours and then insisted on leaving the hospital. Tilley stated that he had two cases in hospital who went down on the *Royal Edward*. One was in the water five hours, the other two hours, and the condition of their nervous system was pitiable. After keeping such cases quiet and comfortable for two or three weeks, local treatment may be undertaken. De Havilland Hall said he had a similar case. The patient was put under ether, and on coming out of it shouted loudly, but lost her voice again. That was thirty-five years ago. He heard of her again some weeks ago. She was still aphonic, Hall remarked that Sir Morell Mackenzie used to say you should attend to the general condition of the patient before trying to restore the voice.

Dundas Grant said he had practised 're-educating' these cases, as one teaches deaf-mutes, by placing the patient's hand under one's

own larynx and uttering a strong guttural sound, then placing one's hand under their larynx and asking them to produce the same. Some take a long time before yielding to treatment. Mark Hovell remarked that in these cases many patients feel that they will never be able to speak again, and it is important to give them confidence by the assurance that their voice will come back. Stuart-Low said that hypnotic and suggestive influences for voice restoration have been found to be very effective. Milligan (in replying) said his practice had been to keep the patient in bed and give **Bromides** and **Valerian.**

Got[3] has observed about a hundred cases in which *deafness* was due either wholly or in part to affections of the inner ear. All the cases showed cochlear hypo-excitability. Of 17 deaf as the result of explosions of shells, 4 were hyper-excitable as regards the vestibule, 11 hypo-excitable, 2 normal. Of 13 deaf as the result of wounds in the neighbourhood of the ear, 5 were hyper-excitable, 4 hypo-excitable, 2 unexcitable, and 2 normal. From the etiological standpoint the cases fall into two groups: one in which the injury is the result of explosions acting through the air as intermediary, the other in which the injury results from projectiles that inflict direct wounds on the head. The second group may be more severe, and may, as in two of these cases, cause total destruction of the internal ear. It seems probable that, apart from the cases of fracture of the petrous bone, the causative lesions are hæmorrhages, more or less considerable, into different parts of the internal ear, combined with detachment of Corti's membrane. In the cases due to shell explosion without a direct wound, the hæmorrhages are probably less violent than in the other form; but there is probably concussion of the organs of Corti, with or without disintegration of the membrane. A positive diagnosis can usually be made from the presence of deafness, tinnitus, vertigo, and nystagmus. To differentiate between organic and functional deafness, the study of the voice resonance is most helpful, but only in the cases where the deafness is very marked or is absolute. In total deafness of organic origin, the patient's voice very quickly acquires the characteristic of the deaf, while in functional lesions the voice remains normal. Where the deafness is absolute, the voice is normal, and the cochlear and vestibular reactions are normal, the question arises whether the case is one of simulation. Most cases improve fairly quickly, but only in psychic cases has the author seen a complete cure. In organic cases vertigo is usually the first symptom to disappear along with the nystagmus; then little by little, the powers of equilibrium becomes more normal; the cochlear symptoms persist more or less. Time and rest are obviously the main factors in treatment. In addition, we may employ counter-irritation or leeches to the mastoid, hypotensive drugs, spinal puncture (for vertigo), and treatment by bromides and iodides (for tinnitus).

References.—[1]*Lancet*, 1916, i, 1080; [2]*Jour. Laryngol. Rhinol. and Otol.* 1916, July; [3]*Gaz. Hebd. des Sci. Méd.* 1915, July.

TONSILS, DISEASES OF. *J. S. Fraser, M.B., F.R.C.S.*

Kahn and Gordon[1] remark that the rhinologist has long sought a drug that will control the hæmorrhage during and following operations on the nose and throat. Calcium salts have been used with indifferent success. Blood-serum gives reliable results, but has the disadvantage that it may produce anaphylaxis. Kahn and Gordon have used **Pituitary Extract** with universally good results. Turbinectomies were almost bloodless. The blood loss following the tonsil operation was greatly reduced. They did not have a single untoward result, in upwards of one hundred cases operated on, which could be attributed to the drug. The coagulation time was reduced to one-third or one-half the normal after the hypodermic administration of pituitary extract. **Coagulen** spoken of favourably (p. 14).

Local Anæsthesia for Tonsillectomy.—Louis J. Burns[2] states that a 2 per cent solution of **Quinine and Urea** is the best. Thirty to forty minims are usually sufficient. It requires five to six minutes for the infiltration to produce marked anæsthesia. Five points of injection on either side are required, while three minims are sufficient at each point. No alarming symptoms are caused if any of the solution is accidentally swallowed. The tissues are completely anæsthetized, no pain being produced by such operative procedures as pulling the tonsil forward from its attachment or the separation of adhesions low down. Anæsthesia usually lasts five to seven hours.

Burns has not encountered in a single case the disagreeable phenomena associated with cocaine and other toxic anæsthetics. Another noticeable advantage is the absence of hæmorrhage, either primary or secondary, due to the injection producing a fibrinous induration in the tissue surrounding the blood-vessels. The induration lasts many days. The great majority of patients expressed themselves as suffering no pain whatever. There is marked diminution of after-pain and discomfort. The solution may be sterilized by heat without damage to its anæsthetic properties.

After enucleation of the tonsils, Marquis[3] has noticed a good deal of reaction along the pillars in the fossæ, and occasional œdema of the uvula; with these conditions was associated great soreness in the throat, difficulty in swallowing, and impaired speech. There was a heavy fibrinous exudate in the tonsillar fossæ which persisted for from four to seven days. Marquis calls it an infection, pointing out that at no time is the mouth free from bacteria. When the tonsil is removed, we have an open surface for their invasion. If this surface is treated with a strong antiseptic, the infection is greatly lessened or prevented. Before the patient leaves the table, after retracting the pillars, 25 per cent iodine is carefully applied to the entire raw surface. Marquis found that there was less bacterial growth in the cases in which the **Iodine** and **Alcohol** had been used. All hæmorrhage must be controlled before applying the iodine, or it will simply be washed away and no effect produced. It is his custom to have ready a tampon, about the size of the tonsil, saturated with alcohol.

Immediately on removal of the tonsil, this replaces it in the fossa and usually prevents the hæmorrhage. The fossa is then painted with the iodine solution. As a rule there is almost no soreness the next day, but where any is present, the same solution is applied.

References.—[1]*Ann. Otol.* etc. 1915, June; [2]*Ibid.* Dec.; [3]*Ibid.*

TRANSFUSION OF BLOOD. (*See* Blood Transfusion.)

TRENCH FEVER. *E. W. Goodall, M.D.*

During the first winter of the war (1914–15) it was observed that the men serving in the trenches and dug-outs in the English lines on the Western front were frequently attacked by illnesses of which the chief symptoms were muscular pains, fever, and bronchitis, occurring either together or singly. These cases were variously diagnosed as rheumatism, myalgia, influenza, and pyrexia of unknown origin. In the spring of 1915, however, it began to be noticed that a definite, and so far as is known a new, variety of fever was present. To it the name 'trench fever' has been applied. The disease appears to have been prevalent during the next winter and up to the autumn of 1916, the time of writing this notice.

Etiology.—The patients have been nearly all young men, or in the prime of life. W. P. Herringham[1] states that it has occurred equally amongst officers and privates, and that at first it was seen only in two classes, those who had been at the front (in trenches, gun-positions, etc.), and those attached, whether as officers, sisters, or orderlies, to field ambulances and clearing stations to which patients were sent. Herringham mentions the case of one man attacked by the disease who had never been at the front, but had been in contact with men suffering from it in a school of gunnery. The disease, therefore, besides being epidemic, would appear to be communicable from man to man, a point upon which several observers are agreed: though how the infecting agent is conveyed, whether directly or indirectly, is not known. McNee, Renshaw, and Brunt[2] suggest an indirect method as more probable—by flies or insect parasites—and lice have been strongly suspected. Herringham refers to the case of a bacteriologist who, attempting to discover whether trench fever was conveyed by lice, allowed several to bite him on the forearm for four days in succession, and fell a victim to a severe attack of the fever. "But the experiment, though suggestive, was inconclusive, because the lice were not all from one patient, and the patients from whom they were taken were not followed up." W. J. Rutherford[3] suggests field voles as a means of conveyance of infection: but while he brings evidence that these animals infest the trenches and their neighbourhood in sufficient numbers to be a pest, yet he has none to show that they are baneful in the way he suggests. From inoculation experiments made by McNee, it appears that the infection resides in the blood of the affected person and can be conveyed in that fluid to the healthy; and further, that it is connected with or included in the red corpuscles, and not

the serum. As regards convection by lice, Herringham, after investigating the incidence of the disease in, and the cleanliness of, three contiguous divisions in the field, concluded that locality, whether trenches or billets, had no effect. He thought it worthy of note that one of the divisions, which had but few cases, had much better facilities for baths than either of the other two, and that in another of the divisions the incidence was, on the whole, though with striking exceptions, greater in the dirty battalions than in those which were clean. He does not exclude the mosquito as a medium, for he has seen mosquitoes in the localities concerned throughout the winter.

On the question of the louse as a factor in the spread of the disease, Basil Hughes[4] writes: "(1) The occurrence of the disease was greatest during the time that conditions in the trenches were worst. (2) On getting back to clean huts in the rest billets, where the men could get a bath, a clean change of underclothing, and could have their uniforms and blankets disinfected, the number of cases fell immediately. (3) On coming away from trenches for a month to a place where personal hygiene could be thoroughly carried out, it was a simple matter to eradicate it. There is therefore, I think, strong presumptive evidence that this is a louse-borne disease, for whenever it was possible to carry out measures for the eradication of lice, the number of cases invariably fell to a minimum."

Symptoms.—The incubation is usually short (two days), but may be as long as twenty-two days. Its onset is usually sudden. The symptoms are severe headache, dizziness, and pain in the legs and small of the back, and also profuse sweating (Hughes). The most characteristic symptom is the pain in the legs; it is always muscular, according to T. Strethill Wright;[5] usually the muscles of the front of the leg are affected, but sometimes those of the calf, and occasionally the thighs, are the seat of pain. The muscles are tender—in some cases to such a degree that the patient cannot bear the weight of the blankets on the legs. The temperature runs up, it may be to 103°, and the pulse-rate varies with it.

The course of the disease varies. McNee and Herringham, and Rankin and Hunt,[6] state that there are two main forms. In the one there is a febrile period lasting a week or ten days; the fever rises gradually to about the fifth day, and then falls gradually to normal. The type of chart of these cases has been termed 'hog-backed.' A single relapse may follow this primary fever. In the other form the primary fever is of short duration—one to three days; then there may be, and usually is, a relapse after another three or four days. The relapse is usually only of a day or two's duration; it may be followed by more relapses. Wright states that this is the only form he has met with. This type of chart has been called 'saddle-backed.' During the afebrile intervals the other symptoms (headache, muscular pains, etc.) disappear; they reappear in the relapses. In the 'saddle-back' variety the rise and fall of the temperature is very sudden, and the temperature chart is of a particularly spiky character.

The bowels are usually confined; in a few instances nausea and vomiting are present. Recovery is usually speedy after the last relapse, though sometimes the patient is left much exhausted. Tachycardia and cardiac irregularity after slight exertion have been observed as a sequel in many cases.

Complications appear to be rare, and the disease is not fatal.

It has been suggested that trench fever is a modified form of paratyphoid or of typhoid fever occurring in men previously inoculated; but frequent bacteriological examinations of the blood, stools, and urine absolutely negative this suggestion.

Treatment.—This consists of **Bed**, a **Purge**, and **Morphia** or **Opium** to relieve pain; but Hughes states that "the two drugs *par excellence* have proved to be **Quinine** and **Sodium Salicylate**"; 15 gr. of each are given with an ounce of brandy. If the quinine is borne well, another 10 gr. may be given next day, with 10 gr. of Dover's powder. On the following day 5 gr. of quinine are given, and 10 of salicylate of soda. After this, for four or five days a pill containing iron, arsenic, strychnine, and quinine is given three times a day. "With this treatment there has been no relapse."

Hughes[1] describes two other varieties of 'trench pyrexia,' differing considerably in their clinical characters from the relapsing fever above described. In the one the onset is preceded by a period of about thirty-six hours, in which the patient complains of malaise and occasionally slight sore throat. Then follow pyrexia, headache, and a feeling of having been 'beaten all over.' There is constipation. The attack is of very short duration, is rarely severe, and does not relapse. In the other forms there are pyrexia (102° to 103°) and acute diarrhœa, with blood and mucus in the stools. This variety is also of short duration, and does not recur. Hughes thinks that the presence of rats in the trenches is associated with this disease. The treatment consists of an ounce of **Castor Oil**; when this has acted, a drachm of **Chlorodyne** in an ounce of brandy, with 15 gr. of **Bismuth Salicylate**, is given three times a day.

References.—[1]*Quart. Jour. Med.* July, 1916, 429: [2]*Brit. Med. Jour.* 1916, i, 225; [3]*Ibid.* 1916, ii, 386; [4]*Lancet*, 1916, ii, 474; [5]*Brit. Med. Jour*, 1916, ii, 136; [6]*Lancet*, 1915, ii, 1133.

TRENCH-FOOT. (*See also* Electrotherapeutics.)

W. I. de C. Wheeler, F.R.C.S.I.

In dealing with recent cases of trench foot, it must be remembered that some of the most acute cases of tetanus have followed infection through broken surfaces in this condition. In recent cases, therefore, it is of the utmost importance to administer a prophylactic dose of 500 U.S.A. units of antitetanic serum.

Raymond and Parisot[1] conclude that the troubles observed in this affection are characteristic of a peripheral neuritis. Among the various etiological causes suggested, they regard cold damp alone as

the important factor, and have asked themselves by what mechanism this cosmic agent acts on the tissues. Thus they have been led to the conception of a local infection of the feet and to a search for the agent. A mould was isolated from the lesions and identified by Professor Vuillemin. Inoculation of pure cultures of this fungus into animals reproduces the typical lesions observed in man—œdema, phlyctenules, black eschars. The authors conclude that the affection is nothing else than a mycetoma of the feet comparable to madura foot, and they propose to call it *pied de tranchée*. The fungus, which is commonly found in infected soil, straw, and manure, is brought into contact with the feet by the mud of the trench, and penetrates into the tissues by the matrices of the nails or through the excoriations so frequently present at points of friction. Almost all the men are carriers of these organisms after a period in the trenches. The local lowering of temperature resulting from standing in the water permits the implantation of the fungus, which shows its optimum development between 25° and 30° C. From these researches prophylaxis and therapy follow, based on the cleansing and disinfection of the feet by means of soaps and of alkaline, or preferably borated and camphorated, washes. The effects have been excellent: œdema disappears in four days, and the neuralgic pain in fifteen to twenty days.

Reference.—[1]*Lancet*, 1916, i, 1187.

TRICHINOSIS. *Herbert French, M.D., F.R.C.P.*

Many authors have referred briefly to the respiratory troubles that may complicate trichinosis, especially thoracic pain, cough, and the physical signs of bronchitis; but Minor and Rackemann[1] appear to be the first to draw attention to the fact that respiratory symptoms may be so prominent that for several days the physician may be under the impression that he is dealing solely with an acute thoracic condition—lobar pneumonia, acute bronchitis, or general tuberculosis of the lungs. This was the case in 9 out of 102 patients whom these authors have analyzed. The difficulty is not likely to arise in Great Britain, where trichinosis is extremely rare; but it seems to emphasize the fact that acute lung lesions are not always what they seem; one recalls another difficulty of a similar kind in those cases of typhoid fever which have a pneumonic onset and initial course.

Successful treatment of a severe case by **Neosalvarsan** (p. 22).

Reference.—[1]*Amer. Jour. Med. Sci.* 1915, ii, 571.

TUBERCULOSIS IN CHILDREN. *Frederick Langmead, M.D., F.R.C.P.*

Some confusion is likely to arise from an imperfect understanding of the special application of the terms 'tuberculous infection' and 'tuberculous disease' as they are now commonly used. J. L. Morse[1] mades the distinction clear. 'Tuberculous infection' indicates merely the state of being infected; 'tuberculous disease' has a more limited meaning—"an alteration in the state of the body or of some

of its organs interrupting or disturbing the performance of the vital functions and causing symptoms." The distinction is not without a difference, for, in round numbers, 10 per cent of all infants have become infected with tuberculosis by the end of the first year of life, and at the age of sixteen not more than 10 per cent have escaped infection, yet a very small proportion have 'tuberculous disease.' Those who have no symptoms are as well as, or perhaps better off than, if they had escaped infection altogether.

A positive von Pirquet test signifies nothing more than tuberculous infection; it does not denote tuberculous disease. Taken in conjunction with other signs it strengthens, but does not prove, the assumption that the condition under observation is tuberculosis. The younger the child the more significant is the test. With certain limitations, a negative result excludes both tuberculous infection and disease.

With most writers, he agrees that tuberculous infection in children is almost always glandular. Although the glands may be demonstrated and their enlargement be proved to be due to tuberculosis, this does not constitute tuberculous disease unless other tissues are involved or there are associated symptoms such as fever, malaise, debility, or loss of weight. D'Espine's sign indicates merely that there is some tissue denser than normal between the trachea and bronchi and the vertebral column. Experience shows that this tissue is generally enlarged bronchial glands, but the sign gives no clue to the cause of the enlargement. If it be accompanied by a positive von Pirquet's test and be persistent, the enlargement is probably tuberculous in origin. Even so, the glands must be regarded as infected merely, and not the site of tuberculous disease, unless the usual constitutional symptoms are present, in the absence of tuberculous foci elsewhere. Opacities about the roots in radiograms have the same significance as d'Espine's sign, and no more.

When physical signs are found in the lungs they are not due to tuberculosis if von Pirquet's test is negative, unless there is reason to suspect acute general tuberculosis, or the child is moribund. When the test is positive, this does not, however, show that the lesion is tuberculous. Von Pirquet's test being positive, if the signs persist or increase, or if they be accompanied by fever and other constitutional symptoms, the diagnosis of tuberculosis is favoured but not proved, for other infections may cause similar symptoms and be equally chronic. Therefore, in many instances, a positive diagnosis can only be made after a considerable lapse of time or the finding of tubercle bacilli.

A history of exposure to tuberculous infection, either human or bovine, especially in the case of young children, and to a lesser degree a family history of tuberculosis, favour a diagnosis of tuberculous infection, which still cannot be called 'tuberculous disease' unless accompanied by symptoms. In this connection too much attention should not be paid to slight rises of temperature, and it must be borne

in mind that disturbances of nutrition, anæmia, debility, fatigue, and malaise may each or all be caused by indigestion, overwork at school, over-exertion, late hours, lack of fresh air, and many things other than tuberculosis. Night sweats are unusual in tuberculous disease in children, and are not uncommon in other conditions. A dry cough may be nasopharyngeal in origin. When this combination of symptoms is unaccompanied by evident physical signs, a diagnosis of tuberculous disease should be made only after a careful and unprejudiced investigation and consideration of all the factors of the case.

REFERENCE.—[1]*Boston Med. and Surg. Jour.* 1915, ii, 654.

TUBERCULOSIS, PULMONARY. *Lewis A. Conner, M.D.*

ETIOLOGY.—W. Gordon[1] has undertaken a rather extensive study of the influence of soil on the prevalence of phthisis, and after eliminating the effects of race, sex, density of population, occupation, rainfall, and winds, exhibits a number of tables which seem to show that the geological formation upon which a city is built has a measurable influence upon the incidence of pulmonary tuberculosis in a locality. In the effort to determine how this influence is exerted, he mentions the case of Salisbury, in which the death-rate from phthisis was diminished by one-half, following drainage which changed it from a very wet town into a very dry one. This change took place in the absence of any alteration in methods of housing or other factors which might have assisted in reducing the phthisis death-rate. He feels justified in concluding that dampness and dryness are the essential features which influence the death-rate from pulmonary tuberculosis, and that the dampness of the soil acts, in part at least, through dampness of the houses.

Weber[2] discusses at some length the subject of traumatic tuberculosis. He dismisses briefly the tuberculous nodules resulting from direct inoculation, as in autopsy wounds or those lesions sometimes acquired by butchers, and directs his attention to the cases of alleged traumatic tuberculosis due to injuries by which tubercle bacilli could not have been introduced from without. In one group, trauma applied to a region harbouring a tuberculous focus, often completely quiescent, is followed by the development of acute general miliary tuberculosis, or possibly a miliary tuberculosis of the lungs. It seems possible at times that the first stage of this process is the lodgement of a few bacilli on the intima of a blood-vessel, followed by the development there of a tubercle which ruptures later. Apparently in these cases the patient is in some way predisposed to the infection. In a second group, active signs of pulmonary tuberculosis may first be noticed after some traumatism to the thorax. It is granted that contusions of the thorax may cause injury of the lung, and that a large percentage of all individuals probably harbour some focus of tuberculosis in the lungs or bronchial lymph-nodes; but he is inclined to think that examples of pulmonary tuberculosis which seem to be connected surely with an injury to the thorax must be very rare.

More common are those instances in which an already obvious pulmonary tuberculosis is clearly aggravated by a local injury. In the third group, trauma to some portion of the body other than the lungs is followed by the development of tuberculosis in the region of the trauma. It may be very difficult in these cases to determine the value of a history of trauma, since exposed parts are always more or less subject to injury ; nevertheless, the trauma may produce a place of lessened resistance where tubercle bacilli, leaking gradually from some other focus in the body, may localize and grow. The statement is made that tubercle bacilli may remain stored up in the bone-marrow for a long while, producing no harm there until the resistance is lowered in some way, as by traumatism. A chronic process can, of course, be rendered acute by injury. In order for a joint tuberculosis to be considered traumatic there should be an interval of from four to six weeks between the injury and the manifestation of symptoms. In all these groups of cases, therefore, it is believed that there must have been present some focus of tuberculosis in the body before the receipt of the trauma.

Brown, Petroff, and Heise[3] were able to demonstrate living tubercle bacilli in river water nearly three miles below the point where the sewage from a health resort was emptied into it. Successful inoculation into guinea-pigs was obtained only when the material was collected on cloudy days. When the material was obtained on sunny days the smears were positive for acid-fast bacilli, but the guinea-pig experiments were not successful. This work naturally points to the necessity of treating infected sewage in some way so that it shall not prove dangerous to others.

Diagnosis.—In the diagnosis of pulmonary tuberculosis there have appeared many papers recently, dealing with the application of the complement-fixation test, and apparently the method has reached such a grade of perfection that the results are comparatively reliable. C. F. Craig[4] employed an antigen consisting of several strains of the human tubercle bacillus extracted with alcohol and filtered. He did not obtain confusing results in cases of syphilis. His technique yielded him 58 per cent of positive results in inactive incipient cases, and much higher percentages in all groups showing a more advanced condition. He obtained 0·8 per cent positive results in patients suffering from diseases other than tuberculosis, and no positives in a group of 150 individuals in good health. His conclusion is that the reaction when positive is specific, and apparently indicates the presence of an active tuberculous focus. H. J. Corper[5] used as antigen an autolyzed emulsion of living bacilli with poorer results, but he could improve them by using a polyvalent emulsion. A. Meyer[6] is of the opinion that the method is as valuable as the Wassermann reaction is in syphilis. Certainly its application is gaining in favour, and it should prove a valuable aid in questionable cases.

Meader[7] has studied the so-called Much granules, and arrived at the conclusion that they are identical, for diagnostic purposes, with

the ordinary Ziehl-staining form of the tubercle bacillus. He is of the opinion that they represent a resistance stage of low virulence, and thinks it of the greatest importance to hunt for them in the sputum of any suspect in which the ordinary forms are not demonstrable. He utilized the so-called 'double stain' of Weiss. In the cases which he examined he found Ziehl-staining forms in 10 per cent. while about 76 per cent showed Much granules. In addition he found these bodies in one specimen of chest fluid.

In a discussion of the use of the **X Ray** in the diagnosis of tuberculosis of the lungs, C. L. Minor[8] emphasizes the fact that in real incipient infection the stethoscope will give much more reliable findings than the *x* ray. The latter will tell more truly the extent of the disease, but the early changes are fully as difficult of recognition by this means as by physical examination. He recommends the use of the fluoroscope rather than plates, and describes the changes from the normal lung picture in incipient tuberculosis as of four kinds: (1) Apical shadows; (2) Apical shrinkage; (3) Hilus shadows, and bands connecting these with the apex; (4) Limitation of motion of the base: finally, filmy bands of infiltration running outward from the hilus to the outer border of the lung field at the second or third rib, though these last are not, strictly speaking, incipient changes. In difficult cases, when plates are made, they should always be stereoscopic (*see also* p. 41).

The **Urochromogen Test** is apparently growing in favour as a procedure of definite prognostic value. A. M. Burgess[9] finds that, of the patients who gave a positive test, over 50 per cent died within three months, and less than 2 per cent lived more than six months. He adds, however, that a negative test has no prognostic value. Corper, Callahan, and Marshak[10] warn us that the presence of a urochromogen reaction in cases showing no clinical symptoms is of no prognostic value, and are inclined to think that the diazo is more reliable. They say that in active pulmonary tuberculosis, when both tests are positive and remain so, it is of grave prognostic import.

Treatment.—In this field there have been but few advances or changes during the year. At the King Edward VII Sanatorium at Midhurst the use of **Tuberculin** was discontinued at the end of 1914, since it failed to show any increase in the efficiency of sanatorium treatment.[11] Similar action was taken at the Hull and East Riding Convalescent Home,[12] where it was concluded that it was prejudicial in a number of cases, although generally the mental effect was good.

Bang[13] protests against the practice of keeping patients flat on their backs after hæmoptysis. He insists that exercise is not nearly as injurious in this condition as has been believed, and although he admits the ill-effects of the contraction of the abdominal muscles as in rising from a recumbent position, he thinks the patient would be much more comfortable, both physically and mentally, if kept in a half-seated posture.

Goldthwaite[14] has been much impressed with the influence of

Posture and the configuration of the chest on the treatment of pulmonary tuberculosis. In the slender anatomic type in which the ribs are lowered and the chest is used in the position of full expiration, full expansion of the chest rarely occurs, and the individual is not only more susceptible to tuberculous infection, but is treated with more difficulty when infected. In other types the chest is deeper, but is compressed from side to side, and the resulting interference with function is much the same. Certain postures also are harmful, and he instances the attitude generally assumed by the patient when sitting in the familiar steamer chair, in which the back is quite convex and breathing interfered with. He advocates the use of rigid backrests for use both in these chairs and in bed, so that the chest will be raised and deep breathing facilitated. He pleads for the early recognition of these anatomic types and postural tendencies in childhood, and the institution of methods of training that will help to correct them.

Artificial Pneumothorax continues to occupy a prominent position among the methods of treatment of pulmonary tuberculosis. With increasing experience of the procedure it is becoming clearer that it is indicated only in a comparatively small percentage of the cases. Riviere[15] discusses this phase of the subject in a careful and conservative study. He points out that the classical case for pneumothorax is one of considerable one-sided disease with the other lung clear or nearly clear to physical examination. It is, however, common experience that the disease progresses but a little way in one apex before the other becomes involved, and therefore these instances, so well suited for pneumothorax, must be of a different type. He goes on to show that in these 'clinically unilateral' cases cavities may develop on one side while the other remains practically clear, but points out that these cavities are situated not at the apices but comparatively low down in the lung. X-ray examination shows that these are instances of 'peribronchial' or, better, hilus tuberculosis, originating in the region of the hilus and spreading along the bronchi. This type is of chronic course and favourable outlook, being much more amenable to treatment than is the apical type. Apical phthisis is much less suitable for artificial pneumothorax. It should not be considered in early cases, for the procedure is not devoid of danger, and the pleural effusion which is so common a complication must be thought a detriment. Moreover, adhesions may form, so that if the patient should need a pneumothorax later, when the disease has developed, it may be impossible. He is inclined to agree with the recommendation of Forlanini "to think of pneumothorax treatment as soon as ulcerative processes appear in the lungs." In acute cases (not miliary) he favours the production of pneumothorax. It is, of course, indicated in uncontrollable hæmorrhage. Contra-indications, he considers, are advanced asthma and emphysema, serious diseases of the circulatory organs or kidneys, intestinal tuberculosis (unless slight), and diabetes.

Sachs[16] says that pneumothorax is indicated in all progressive cases (particularly with unilateral involvement) which fail to respond to strict sanatorium regimen. He insists that most of the complications can be avoided by extreme care in technique. Pleural effusion is the most common complication. Peters[17] feels confident that, given a sufficient number of cases and a proper amount of time, more or less effusion will develop in 90 per cent of the cases. The effusion is usually serous, but may be purulent, containing only the tubercle bacillus. He thinks it had better be left alone unless it produces pressure symptoms or becomes the seat of a mixed infection, when, of course, a thoracotomy should be done. M. E. Lapham[18] thinks that the majority of effusions can be avoided by proper technique, especially by the avoidance of too great pressure. She thinks that the reading of the manometer may be an inaccurate guide when the mediastinal pleura stretches and yields. When tension is raised with adhesions, she thinks that oxygen is safer than nitrogen. Other complications occur occasionally. E. N. Packard[19] reports a case in which there had evidently been some necrosis of the lung tissue. This extended under the influence of the pneumothorax, and putrefaction and gangrene supervened.

Woodcock[20] thinks that shock is the complication most to be feared, and recommends that local anæsthesia always be used and the gas warmed. The gas must be allowed to run in slowly, and stopped immediately on the appearance of any untoward symptoms. The manometer must be watched carefully.

The chemotherapy of tuberculosis has made but little progress. Perhaps the most striking findings are those of DeWitt,[21] who has been working with some of the derivatives of **Methylene Blue.** In none of the animals tested did a cure result, but those treated with iodmethylene blue lived considerably longer than the controls; as did also those treated with the mercuric chloride salts of methylene blue. The distribution of the lesions in these animals was also much more restricted than in the control animals. Her results are not at all conclusive, but are admittedly encouraging.

See also **Emetine** (p. 17), **Garlic** (p. 19). and **X-ray** therapy (p. 47).

References.—[1]*Med. Press and Circ.* 1915, ii, 540; [2]*Clin. Jour.* 1916, xlv, 249, 264; [3]*Trans. Nat. Assoc. Study and Prev. Tuberc.* 1916, xii, 287; [4]*Amer. Jour. Med. Sci.* 1915, cl, 781; [5]*Trans. Nat. Assoc. Study and Prev. Tuberc.* 1916, xii, 205; [6]*Ibid.* 219; [7]*Amer. Jour. Med. Sci.* 1915, cl, 858; [8]*Trans. Nat. Assoc. Study and Prev. Tuberc.* 1916, xii, 139; [9]*Jour. Amer. Med. Assoc*; 1916, lxvi, 82; [10]*Trans. Nat. Assoc. Study and Prev. Tuberc.* 1916, xii, 295. [11]*Brit. Med. Jour.* 1916, i, 763; [12]*Med. Press and Circ.* 1916, ii, 19; [13]*Ugeskr, f. Laeger.* 1916, lxxviii, 419 (abst. in *Jour. Amer. Med. Assoc.* 1916, lxvi, 1590); [14]*Boston Med. and Surg. Jour.* 1916, clxxv, 88; [15]*Lancet*, 1916, ii, 101; [16]*Jour. Amer. Med. Assoc.* 1915, lxv, 1861; [17]*Med. Rec.* 1915, lxxxviii, 601; [18]*Amer. Jour. Med. Sci.* 1916, cli, 421; [19]*Ibid.* 887; [20]*Edin. Med. Jour.* 1915, xv, 314; [21]*Trans. Nat. Assoc. Study and Prev. Tuberc.* 1916, xii. 257.

TUBERCULOSIS, RENAL. (*See* Kidney. Surgery of.)

TUMOURS, PIGMENTED. *W. I. de C. Wheeler, F.R.C.S.I.*

Broders and MacCarty[1] discuss the nomenclature of pigmented malignant tumours, and note the lack of uniformity of opinion as to what these tumours are histogenetically. The majority of writers utilize the term melanosarcoma, which has its bas's of usage in the old classification of neoplasmata. The authors point out that the direct continuity of the spindle and oval cells with the basal cells of the skin can be demonstrated in nævi and melanotic growths. The cells of the latter often have an alveolar arrangement very characteristic of epithelial tumours. Such alveolar growths have been called alveolar sarcomata and endotheliomata, the latter term inferring their origin in the lining of vessels. In the authors' experience there is no evidence of vascular structure in connection with the alveolar arrangement. The term melano-epithelioma is preferred by them, instead of melanosarcoma, when the condition arises in the skin, inasmuch as the pigment-bearing cells of the skin and perhaps the choroid (both of which are the source of tumours of this series) have their origin in the ectoblastic layer rather than the mesoblastic. They conclude:—

1. The so-called 'melanosarcoma' should be called properly a melano-epithelioma when such a condition arises in the skin.

2. The condition arises as a migratory hyperplasia of the basal (regenerative or germinative) layer of the skin, and invades the subcutaneous tissues and distant organs as pigmented and non-pigmented oval, spherical, or spindle cells, all of which cells are frequently found in the same specimen or even in the same microscopic slide.

3. The evolution of such neoplasmata in the regenerative cells corresponds to the evolution of cancer in the skin, mammary gland, prostatic gland, and stomach.

4. The alveolar arrangement of cells in this series shows no evidence of any relation to vascular endothelium.

5. The condition is one of middle life, although it may be found from childhood to old age.

6. An attempt at determination of the exact duration of the condition from its onset to a fatal termination has failed in this series.

7. There is no specific region of the skin which seems especially predisposed to the development of melano-epitheliomata unless it is on the lower extremities, which in this series form the greatest frequency of location.

8. Nævi certainly predispose to the development of the condition.

9. Metastasis is usually to the regional lymphatic glands.

10. From an economical or practical standpoint melano-epitheliomata which arise in the skin have a high mortality.

11. Melano-epitheliomata or melanosarcomata arising in the eye have a much better prognosis than melano-epitheliomata arising in the skin.

12. From a therapeutic standpoint the pathological history of melano-epithelioma clearly points to the necessity of an early diagnosis

and a radical removal of the primary lesion and regional lymphatic glands.

13. From a prophylactic standpoint, pigmented areas of skin, such as warts and nævi, should be removed when these are in locations which are or have been subjected to injury.

REFERENCE.—[1]*Surg. Gyn. and Obst.* 1916, ii, 28.

TYPHOID FEVER. (*See also* PARATYPHOID FEVER.)

E. W. Goodall, M.D.

DIAGNOSIS.—Several of the papers published during the past year deal with the serum diagnosis of typhoid and paratyphoid fever, particularly in patients who have previously been inoculated against typhoid. Dreyer's standard method of observing agglutination (see MEDICAL ANNUAL, 1916, p. 616)—a refinement of the macroscopic method—has come into very general use; the majority of observers appear to be well satisfied with it, and it has been adopted by the Medical Research Committee.

Serum methods (Dreyer's or others) have been very frequently made use of in the diagnosis of typhoid from paratyphoid fever, because the method of blood-culture is not always available. It will be remembered that at first there was difficulty in interpreting the results of typhoid reactions in persons who had been previously inoculated within a year or two of the attack of fever whose nature was under investigation. Dreyer and others showed that when typhoid infection occurred in the inoculated cases, the agglutination titre rose during the course of the attack, so that a diagnosis could be arrived at by serum reactions made every few days. While this is in general true, C. J. Martin and W. G. D. Upjohn,[1] confirming previous observations of Grattan and Harvey[2] and others, found that in some patients infected with paratyphoid bacilli, who had previously been inoculated against typhoid, the production of paratyphoid agglutinins was preceded by a production of typhoid agglutinins, the latter occurring several days and even weeks before the former. Hence the serum reaction must be repeated in suspected paratyphoid cases which have been previously inoculated against typhoid, over a considerable period of time; for in them the initial rise of the typhoid agglutination titre is by no means to be taken as diagnostic of a typhoid infection.

According to Sladden[3] the 'zone phenomenon' is more commonly met with in Dreyer's than in other methods. This consists of the occurrence of agglutination in higher dilutions of a serum, while the lower dilutions fail to agglutinate. Sladden states that by using distilled water as a diluent in place of normal saline, the negative zone is diminished and the test rendered more delicate. The phenomenon does not appear to have any particular significance; but observers must not be content with negative results at low dilutions.

Tidy[4] made the statement that the agglutination produced by anti-typhoid inoculation disappears during, or is diminished by, febrile conditions. Consequently, a positive agglutination obtained during

a febrile attack in a previously inoculated person has the same value as in an uninoculated person. Dreyer and Ainley Walker,[5] however, have shown that these conclusions are erroneous.

Ritchie,[6] as a result of observations of serum reactions in 535 healthy uninoculated males and 257 similar females, concludes that complete agglutination should be regarded as of positive value in diagnosis in 1–32 (or above) dilution as regards the typhoid bacillus, and in 1–16 (or above) dilution as regards the paratyphoid bacilli. The serum of females is normally more strongly agglutinative than that of males. Curiously enough, the serum of persons intimately engaged with the sick (medical students, etc.), agglutinates in higher dilutions than does that of other normal persons.

For further and detailed information on these subjects the reader is referred to papers by Inman,[7] Cleary,[8] Hamilton,[9] Dévé,[10] Ainley Walker,[11] Dreyer, Gibson, and Walker,[12] Davison[13], Coles,[14] and Salomon.[15]

Antityphoid Inoculation.—The value of this measure as a prophylactic becomes more firmly established, as appears from reports concerning not only the British Navy by Bassett-Smith,[16] and Army, by Fleming,[17] and the French Army by Rimbaud,[18] Tournade,[19] Vidal,[20] Courmont,[21] Labbé,[22] but also the German and Austrian Armies by Goldscheider and Kroner,[23] and the Hungarian Army by Fejes.[24] In the United States, prophylactic inoculation has been employed to a considerable extent with success in the civil population in various districts (see a paper by Sawyer[25]). An elaborate and detailed mathematical consideration of antityphoid and anticholera statistics will be found in a paper by Greenwood and Yule.[26]

Treatment.—A report by Whittington[27] gives details of 230 cases of typhoid treated with **Stock** (R.A.M.C.) **Vaccine.** In 29 the vaccine had apparently a definite good influence ; but 20 of these cases were of a class in which good results were to be expected by the ordinary therapeutic measures. On the whole the results seem to have been disappointing, that is, when comparison is made with other methods of treatment. The author concludes that vaccine treatment by stock vaccines is not to be recommended as a routine measure. On the other hand, Petrovitch,[28] reporting the results obtained in military practice in Serbia, found that whereas the case-mortality in 1020 cases treated by ordinary methods was 12·8 per cent, that of 2270 treated by vaccines was only 2·7. Small doses—5 to 50 millions of typhoid bacilli killed by heat—proved as efficacious as larger ones.

The intravenous injection of vaccines is advocated by Helen McWilliams[29] and Gay and Chickering.[30] The former writer gives a bibliography of the subject. Upwards of 550 cases have been reported ; in more than half of them the disease is stated to have been cut short by the remedy. The dose is from 100 to 250 million bacilli. In a few cases death seems to have been caused by the treatment, which would appear also to produce at times hæmorrhage into and from various organs. Gay and Chickering report 53 cases

with a case-mortality of 9 per cent. They employed a sensitized, polyvalent, killed vaccine, in doses of 150 to 300 million bacilli.

Labbé and Moussaud[31] claim to have obtained good results with **Colloidal Gold** by intravenous injection in doses of 1 c.c. increased to 2 c.c. in the course of a few days. The immediate effect of an injection is a rigor and profuse perspiration. The course of the disease is cut short.

An excellent paper on *typhoid perforation* and its treatment by operation, with an account of 155 cases, has been published by Gibbon,[32] of Philadelphia. In 112 of the cases an operation was performed ; 27 patients recovered, a rate of 24 per cent. In 16 cases in which no perforation was found at the operation, recovery took place in 10.

Chalmers and Macdonald[33] draw attention to a febrile affection they have met with in the Anglo-Egyptian Sudan. The symptoms closely resemble those of mild attacks of typhoid or paratyphoid ; but there is no eruption, and constipation rather than diarrhœa is the rule ; there were no fatal cases. Typhoid and the paratyphoids are met with in the Sudan ; but both the bacteriological and the serological evidence went to show that this new disease was not one of the three. The authors believe the cause of the disease to be a short, non-motile, Gram-negative bacillus related to the paratyphoid-Gaertner sub-group of the typhoid-colon group.

References.—[1]*Brit. Med. Jour.* 1916, ii, 313 ; [2]*Jour. R.A.M.C.*, 1911, xvi, 9 ; [3]*Lancet*, 1916, ii, 273 ; [4]*Ibid.* i, 241 ; [5]*Ibid.* ii, 419 ; [6]*Ibid.* i, 1257 ; [7]*Quart. Jour. Med.* 1915, Oct. 57 ; [8]*Jour. Amer. Med. Assoc.* 1915, ii, 1364 ; [9]*Ibid.* 1873 ; [10]*Presse Méd.* 1915, Nov., 436 ; [11]*Lancet*, 1916, i, 17 ; [12]*Ibid.* 766 ; [13] *Jour. Amer. Med. Assoc.* 1916, i, 1297 ; [14]*Brit. Med. Jour.* 1916, i, 684 ; [15]*Med. Press and Circ.* 1916, Aug., 123 ; [16]*Jour. Roy. Nav. Med. Service*, 1916, Jan., 37 ; [17]*Pract.* 1916, i, 85 ; [18]*Presse M d.* 1915, 469 ; [19]*Ibid.* 475 ; [20]*Ibid.* 437 ; [21]*Brit. Med. Jour.* 1916, i, 27 ; [22]*Presse Méd.* 1916, 20 ; [23]*Wien. med. Woch.* 1915, Aug. 21 (*Brit. Med. Jour.* 1915, ii, 836) ; [24]*Deut. med. Woch.* 1916, Apr. 6 (*Med. Rec.* 1916, June, 1013) ; [25]*Jour. Amer. Med. Assoc.* 1915, ii, 1413 ; [26]*Proc. Roy. Soc. Med., Epid. Sect.*, 1915, June 4 ; [27]*Lancet*, 1916, i, 759 ; [28]*Bull. de l'Acad. de Méd.* 1916, June 13 (*N. Y. Med. Jour.* 1916, ii, 275) ; [29]*Med. Rec.* 1915, ii, 648 ; [30]*Arch. Internat. Med.* 1916, xvii, 303 (*Dublin Med. Jour.* 1916, July, 137) ; [31]*Presse Méd.* 1916, March, 105 ; [32]*Ann. Surg.* 1915, Oct. 385, and 539 ; [33]*Lancet*, 1916, ii, 139.

TYPHUS FEVER.

E. W. Goodall, M.D.

Bacteriology.—Plotz, Olitzky, and Baehr[1] record the results of research work undertaken by them to ascertain the causal organism of typhus fever. The first of these workers succeeded, by using anaerobic cultivation, in isolating from the blood of all of 7 cases of European epidemic typhus, and of 18 out of 34 of the endemic form met with in New York (known as 'Brill's disease'), a small (1 to 2 μ), non-motile, pleomorphic, Gram-positive bacillus. It is non-spore-bearing, and is killed by exposure to a temperature of 55° C. for ten minutes. In only 2 cases (out of 15 examined) was the bacillus found in the blood after the crisis had taken place. It could not be

found in 198 cases of febrile disease other than typhus, examined as controls. The blood of patients suffering from typhus, taken just before the crisis was reached, clumped the bacillus. In 8 out of 24 guinea-pigs, and in 1 out of 4 monkeys, inoculated with the blood of patients suffering from typhus fever, and in which a febrile affection was set up, the organism mentioned above was found. It was observed that the positive result was present only in animals in which the febrile reaction had been severe.

Paul Gastou,[2] working in Belgrade during the epidemic in the early part of 1915, obtained from the blood and cerebrospinal fluid of typhus cases a very small, slender bacillus, and a diplococcus, either separately or in combination. He found these organisms also in lice taken from typhus patients; but whether the bacillus was the same as that described by Plotz or not, he was unable to ascertain.

Etiology.—Several clinical accounts have now appeared of the typhus epidemic in Serbia and of outbreaks in other places. Of these, one of great interest is that given by Davy and Brown,[3] because it is a fine example of what can be done in the way, not only of successfully treating the patients, but also of keeping records of the cases under most unfavourable circumstances. Their paper deals with some 2000 cases in a prison camp (Gardelegen) in Germany. They state that the first cases in the epidemic were mild and atypical, and were not recognized. The difficulty in diagnosis was enhanced by the fact that a large number of cases of scarlet fever and of tonsillitis with anomalous rashes had been occurring. The camp swarmed with lice, and the authors of the paper have no doubt that it was by these insects that the infection was spread. Those in attendance upon the sick, and the doctors, experienced the heaviest incidence and fatality, a fact which is taken by the authors to be evidence of the influence of mass infection. There was, however, one exception, as appears from the following statement: "The twelve doctors in the camp who contracted typhus were all nursed by the same six orderlies. The period of attendance of these orderlies lasted in all over three months; their precautions in handling the dejecta were of the scantiest, yet none of these attendants contracted the disease. The explanation that occurs to us is that they nursed their patients in separate huts, and they and their patients remained for the whole period lice-free." It was also noticed that the patients in the camp hospital who were suffering from other diseases than typhus did not contract the latter disease so long as they were kept free from lice, even though they were nursed by the same orderlies as nursed the typhus cases.

There was evidence that the infective agent remained in the body for at least three weeks after defervescence of the fever; for "fresh outbreaks occurred when patients were returned to their companies after the three-weeks period, though they and their clothes were disinfected and were presumably lice-free. When the period of isolation was extended to one month, recrudescence of the epidemic in the companies of these returned patients did not occur."

Symptoms.—Besides the well-known early symptoms, in many cases the patient was seized with general convulsions, succeeded by active delirium. An initial rigor was uncommon. A prodromal rash was seen in a few cases, as a mottling on the backs of the wrists and forearms, twenty-four hours before the rash proper appeared. It was very transient, and was generally followed by a profuse rash. Another early symptom was an increasing pulse-rate, noticeable even before the temperature began to rise. The patients at the same time complained of headache and malaise.

In most cases the temperature fell temporarily on the third or fourth day, sometimes even to normal. Though defervescence began on the eleventh to fourteenth day, not often in this epidemic was the temperature observed to fall by crisis; usually it was by a somewhat rapid lysis. In some cases there was a low irregular temperature throughout, and such did badly.

In respect of the rash, the authors state that the macules became hæmorrhagic within twenty-four hours. The colour of the macules when mature was of a reddish-copper—never 'mulberry.' Delirium was present in 75 per cent of the cases; it was usually active and often violent. Occasionally it persisted after the temperature had become normal.

The most frequent complications were hypostatic congestion of the lungs; otitis media; suppuration of the parotid glands; cardiac-muscle degeneration, as shown by dilatation of the heart and syncopic attacks; gangrene of the feet; bedsores; and peripheral neuritis of the extremities.

Treatment.—In spite of the very unfavourable surroundings, the severity of the disease, and the ages of the patients (average about 29 years), the case mortality was only 15 per cent. which speaks well for the treatment. This consisted in absolute **Rest** in the recumbent position till a week after the temperature had become normal; attention to **Cleanliness of the Mouth; Nourishment** in a liquid form; **Stimulation,** and **Morphia.** The stimulants employed were camphorated oil, strychnine, and ether. The authors found that the oil (given by hypodermic or intramuscular injection) set up abscesses and was not absorbed, and they are of the opinion that it was of no use.

As regards the Serbian epidemic as he saw it at Belgrade, Gastou[2] states that he noticed a predominance of cerebrospinal symptoms (stiffness of the neck, ocular paralysis, paresis, etc.). In some cases evidence of cerebrospinal meningitis was found post mortem. With early symptoms there was occasionally found a catarrh of the cavities of the nose, mouth, and pharynx. He met with fulminating cases of the disease in which death occurred in from three to six days. For treatment he recommends the intravenous injection of a sterilized isotonic solution of either **Sodium Citrate** or **Tincture of Iodine**; the former, which he terms citrated serum, consists of a 2 per cent aqueous solution of sodium citrate; the latter, called iodized serum, of 20

drops of tincture of iodine in 300 grms. of sterilized isotonic water. He prefers the latter. An injection of 20 c.c. of either solution should be given every other day.

While it is now generally accepted that the infection of typhus is conveyed by the louse, yet some of the authors quoted state that in their opinion this is not the sole method of conve tion. It may be remembered that in the pneumonic form of plague there are strong reasons for believing that the infective agent may be conveyed by the expectoration ; so also may be the case in typhus fever. But undoubtedly, to prevent typhus from spreading, measures must be taken first to destroy the lice, not only on those suffering, but on those who yet remain unattacked ; and further, to prevent the insects from attaching themselves upon those who are free from them. Such measures would include the provision of quarantine stations, in which the cleansing and bathing of persons and the disinfection of clothing and other articles could be carried out. Doctors, nurses, and orderlies who are brought in contact with the sick should wear suits of overalls made to fasten closely round the ankles and wrists and also the neck ; better still is it to have a headpiece attached in which is an opening only for the eyes. For keeping down lice, a powder largely used in the army is that known as N.C.I., which consists of naphthalene 96 per cent, creosote 2 per cent, and iodoform 2 per cent. For details on these matters the reader is referred to papers by A. D. Peacock,[4] J. P. Kinloch,[5] and E. K. Tullidge.[6]

For a good historical account of typhus, brought up to the present day, the Chadwick Lectures, by R. O. Moon,[7] should be consulted.

References.—[1]*Jour. Infect. Dis.* 1915, July ; [2]*Rev. de Méd.* 1915, Nov., 559 ; [3]*Brit. Med. Jour.* 1916, ii, 737 ; [4]*Ibid.* 1916, i, 745 and 784 ; [5]*Ibid.* 1916, i, 789 ; [6]*N. Y. Med. Jour.* 1916, i, 1167 ; [7]*Lancet*, 1916, i, 1069.

ULCERS, VARICOSE. (*See* Varicose Ulcers.)

ULNAR PARALYSIS. (*See* Paralysis, Ulnar.)

URETER, SURGERY OF. (*See also* Bladder and X-ray Diagnosis.)

J. W. Thomson Walker, M.B., F.R.C.S.

Bissell[1] discusses the surgical treatment of the *tuberculous ureter* in the female. Our present knowledge, he states, leads to the conclusion that when the kidney is tuberculous the ureter is partly or wholly involved also, and the common site of involvement is the lower end. When the kidney alone is removed, the success of the operation is often jeopardized. If the vesicovaginal portion is left, it becomes a possible source of progressive pathological disturbance ; but the lumbar and pelvic segments of the ureter are the sources of greatest danger, and should be treated surgically. The removal of the vesicovaginal portion simultaneously with the removal of the kidney and the rest of the ureter is, however, open to question.

The retroperitoneal route for the removal of the kidney and ureter is that usually adopted, and the ureter is treated in one of the following ways: (1) The removal of a small portion; (2) Removal of a small portion, with the kidney, and the injection of several minims of 95 per cent carbolic acid into the remaining portion of the ureter, which is then ligated and left; (3) Removal of a small portion of the ureter with the kidney, and stitching the cut end in the lower angle of the wound; (4) Removal of as much of the ureter as can be reached through the original incision, or a combination of incisions, ligation, and sterilization of the cut end. The author recommends a combination of transperitoneal and retroperitoneal routes. The first part of the operation consists in opening the abdomen by a median incision between the umbilicus and symphysis pubis, placing the patient in the Trendelenburg position, and dissecting out the ureter, tying it below the uterine artery, and treating the end with carbolic acid and alcohol. The dissected ureter is folded up in the retroperitoneal space, just below the kidney, and the peritoneum and abdominal wound are closed. The patient is now turned over, and the kidney explored from the loin and removed with the ureter. The advantages of the transperitoneal route are greater in the female than in the male subject.

In an article on the diagnosis of *ureteral calculus*, Pedersen[2] refers to the use by Harris of a whalebone filiform bougie, 75 cm. long, tipped with wax. The method of sounding the ureter with a wax-tipped bougie was introduced by Kelly, and was used in the female, through Kelly's tubes. When, however, the catheterizing cystoscope was used, as was necessary in the male, the wax tip was scratched by the metal of the cystoscope, and the method was unreliable. Harris introduced the following ingenious method: A long whalebone ureteral bougie, tipped with wax, is pushed along the urethra, and the end coils up inside the bladder. The catheterizing cystoscope is then threaded along this, and the bougie withdrawn until the inner wax tip is just beyond the bladder end of the catheter tunnel, and in this way contact with the metal cystoscope is avoided. Pedersen thought that damage to the urethra might be produced by the passage of the wide fenestrum of the sheath of the cystoscope over the filiform bougie as it lies in the urethra. He therefore devised a special form of obturator to make the cystoscope slide over the bougie without damaging the urethra.

After a consideration of the errors in diagnosis shown by a study of 153 cases of stone in the kidney and ureter, the following conclusions are drawn by Cabot[3]: (1) In all cases of abdominal pain of a recurring or abdominal type, in cases of backache, lumbar or sacro-iliac strain, or lumbago, careful and repeated examination of sedimented urine, as well as the taking of *x*-ray plates, should precede positive diagnosis; (2) The possibility of error in the judgement of *x*-ray plates should be excluded by the use of the ureteral catheter, stereoscopic plates, injected radiography, or the wax-tipped

catheter; (3) Where the symptoms suggest ureteral calculus, and a doubtful shadow appears, if the ureter cannot be satisfactorily catheterized, the decision for or against operation must be made upon the apparent gravity of the symptoms; (4) Where all other methods fail, the wax-tipped catheter is probably the most unerring guide, except when the stone lies out of reach in a dilated calix.

Braasch and Moore[4] discuss the cases of stone in the ureter observed at the Mayo clinic. Up to June, 1915, 230 stones were found lodged in some part of the ureter, and, in addition to this, there were 64 cases where the stone lodged in the ureter was either removed at the time of the cystoscopic manipulation, or was passed immediately after. Pain in these cases was referred largely to the renal area in 197 (67 per cent), to the upper abdominal quadrant in 45 (15 per cent), to the region of the lower ureter in 28 9) per cent), and to the suprapubic area in 3 cases. In a number of instances the radiation of pain was so typical of disease in the gall-bladder that, in the absence of urinary findings, exploration of the gall-bladder would have been justifiable without a preliminary *x*-ray examination. Vesical irritability was present in 74 per cent of cases, and was especially noticeable where the stone was lodged in the vesical portion of the ureter.

The practical value of the presence of a few red blood-cells or pus-cells in the urine in the diagnosis of ureteral stone has been exaggerated. Similar microscopic elements are found so frequently in the urinary sediment with slight lesions in the lower urinary tract, that its diagnostic value is greatly lessened. The presence of a few red blood-cells or pus-cells in the urine, however, necessitates a careful *x*-ray examination of the urinary tract, even though the subjective symptoms are of negative value. On the other hand, the absence of these cells would not exclude the possibility of stone in the ureter. Catheterization of the ureter may localize the origin of pus-cells, but is of no value in localizing a few red blood-cells, as the catheter may cause traumatic hæmorrhage. Gross hæmaturia was found in 41 cases (14 per cent). Stone in the ureter is rarely palpable through the abdominal wall, but the authors report one stone 4 in. long that could be felt. In all probability the majority of stones pass spontaneously, and for this reason surgical interference is seldom indicated with the first attack of pain. While no rule can be adopted, it would be rational, in the majority of cases, to wait at least two or three months, until nature has made several attempts to dislodge the stone. On the other hand, repeated violent colic, the danger of renal destruction, and other complications, as the result of an obstructing stone, may necessitate its removal before this period has elapsed. Before an abdominal operation is attempted, the passage of the stone may be aided by the various methods offered by endoscopy, namely: (1) Catheter manipulation; (2) Injection of sterile glycerin or oil; (3) Fulguration; (4) Ureteral dilatation; (5) Cutting of the

meatus ; and (6) Ureteral forceps. By these various methods stone in the ureter was removed in 64 cases.

References.—[1]*Surg. Gyn. and Obst.* 1915, ii, 615 ; [2]*N. Y. Med. Jour.* 1916, i, 1069 ; [3]*Surg. Gyn. and Obst.* (Abstr.), 1916, i, 544 ; [4]*Jour. Amer. Med. Assoc.* 1915, ii, 1234.

URETHRA, SURGERY OF. (*See also* Bladder, Diseases of.)

J. W. Thomson Walker, M.B., F.R.C.S.

Day[1] describes a method of destroying *limited obstructive glandular growths in the posterior urethra* by the high-frequency current. The ordinary fine electric-cautery point destroys too small an amount of tissue at each sitting, and is useful only for very small projections and growths. The author favours the bipolar high-frequency current, as the destruction of tissue is much more rapid and extensive, and secondary hæmorrhage is less likely to occur. In certain cases, such as partially removed carcinomatous prostates with suprapubic fistula, contraction of the bladder arch, when a punch will not pass, and in other conditions, the ordinary bipolar current is inadequate for the destruction of the large amount of tissue necessary. One of the difficulties is in the insulation of a suitable wire for the amount and character of current required. Day uses silica tubing of No. 11 Charrière calibre, which, although not flexible as a perfect insulating material should be, is nevertheless efficient as an insulator. With this device a much greater amount of tissue can be cauterized at one sitting than by ordinary high-frequency methods. The application can be made more accurately, and the fear of hæmorrhage and reaction is diminished.

Thompson[2] summarizes the points of distinction between traumatic and gonorrhœal strictures : (1) If a stricture occurs in early life, it is probably traumatic ; (2) Traumatic stricture at other ages is rarer than gonorrhœal; (3) Traumatic stricture is in many cases extra-urethral as well as intra-urethral. gonorrhœal stricture is only intra-urethral ; (4) A traumatic stricture is shorter than a gonorrhœal stricture ; (5) A traumatic stricture at about thirty years of age may have had a longer history than a gonorrhœal stricture ; (6) Traumatic stricture of some years' standing leads to an earlier death than does one due to gonorrhœa.

Hyzer[3] divides cases of *inflammation of the verumontanum* into infective and non-infective : the former resulting from infection with the gonococcus or *Bacillus coli*, and the latter from masturbation. new growths, and other causes. The diagnosis is made on the clinical history, and verified by the urethroscopic findings ; but inflammation at the neck of the bladder, and in the prostatic urethra and prostatic bars, should be excluded. In the infective type, the focus is in the prostate and vesicles, and it is useless to direct treatment to the verumontanum. In the non-infective type, the neurotic element should be remembered and general measures adopted. **Dilatation** of a tight sphincter ani may help, and dilatation of the posterior urethra

with a Kollman dilator, and topical application of silver nitrate, iodine, and copper sulphate solution give good results. In long-standing cases, where there is a hard fibrous verumontanum, the operation of **Colliculectomy** will give gratifying results.

Verumontanitis, as it is termed, is also the subject of an article by Pennock.[4] Changes in the verumontanum include simple hyperæmia, œdema, cystic formation, ulceration, hypertrophy, infiltration, and pus collections in the prostatic ducts. The symptoms may be urinary or genital. Urinary symptoms comprise frequent micturition, precipitant micturition, burning sensation in the prostatic urethra, tenesmus, hæmaturia, pyuria, shreds, urinary obstruction, nocturnal enuresis, dribbling of urine, feeling of dampness in urethra. Genital symptoms include diminution of sexual power of varying degree, premature or delayed ejaculation, painful ejaculation, rarely priapism, nocturnal emissions. Other symptoms are referred pain—suprapubic or lumbar—which may be a dull ache, or sharp and severe. Pain may also be referred to the testicle, coccyx, or rectum. A persistent mucoid urethral discharge is sometimes present. Many of these patients are so neurotic that their symptoms must be regarded as due both to the actual lesion and to psychic disturbance. The symptoms do not form a characteristic grouping.

In pyogenic cases, treatment should first be directed to curing the inflammation of the prostate and vesicles. Injection of the sinus pocularis, while valuable, is only an adjunct in cases where the infection persists in the pocket. In acute cases the application of 5 per cent nitrate of silver solution to the mucous membrane of the prostatic urethra gives decided relief. In subacute cases, where the verumontanum is soft, 20 per cent silver nitrate is used; and when the verumontanum is harder and firmer fused silver nitrate should be used, and the action neutralized with sodium chloride before removing the tube. In chronic cases the hypertrophied portion of the verumontanum is amputated, and fused silver nitrate applied. Hawkins states that if a little oil is left in the urethra after the application of the silver nitrate, the patient suffers less. Epididymitis may develop during treatment.

References.—[1]*Jour. Amer. Med. Assoc.* 1915, ii, 1797; [2]*Clin. Jour.* 1916, Jan., 9; [3]*Surg. Gyn. and Obst.* (Abstr.), 1916, i, 652; [4]*Jour. Amer. Med. Assoc.* 1915, ii, 1167.

URINARY IMPAIRMENTS AND LIFE ASSURANCE. | *F. D. Boyd, M.D.* | *John D. Comrie, M.D.*

Ogden[1] contributes an important study of 59,270 exposures of ordinary Life assurance showing urinary impairments at the time of acceptance. For purposes of analysis the 59,270 cases are divided into ten groups, according to the urinary impairments found by chemical and microscopic examination of the urine at the time of acceptance. No substandard or special cases are included, but only those accepted on some of the regular plans of ordinary policies issued

by the Metropolitan Life Assurance Company. The period covered in the study is practically ten years.

GROUP 1.—*Slightest trace of albumin. Relatively normal solids. rarely a cast, renal cell, or abnormal globule.*

These are the cases which have been the terror of the insurance world and considered by some extra-hazardous, while others have believed that they were suitable for policies only on a substandard plan. Practically all were comparatively young people under forty years. They were looked upon as examples of temporary disturbance of renal function. In this group there were 5546. The expected claims were 58, the actual claims 31. Of the 31 claims, only 10 cases of death had a direct or indirect connection with the kidneys.

GROUP 2.—*Slightest possible trace of albumin. Relatively normal solids. Excess of leucocytes and urethral or neck-of-bladder cells. Some squamous epithelium. Rare or occasional blood-globules. No casts found.*

The condition represented by these findings is one of slight irritation in the urinary tract *below* the kidneys and ureters. In this group were included females showing slight disturbance of the bladder and the urethra. The conditions in this group are looked upon as relatively unimportant and in no way affecting longevity. The number of exposures was 23,061. The probable claims were 227·5, the actual claims 94. Of the deaths, only a few were in any way connected with the urinary tract.

GROUP 3.—*No albumin detected. Relatively normal solids. Rarely a hyaline or granular cast, renal cell, or blood-globule.*

There was thus evidence of slight disturbance of the kidneys, but without any trace of albumin, and no evidence of disturbance in other parts of the urinary tract. Practically all were under forty years, and invariably with a first-class history in other respects. The number in this group was 503. The number of probable claims was 5·3. There was only 1 claim : cause of death, pneumonia.

GROUP 4.—*No albumin. Low specific gravity* (1012 *or less*). *Relatively low urea. No casts or other morphological elements found.*

One of the most perplexing groups of cases in judging of the fitness of applicants for insurance is that showing persistent low specific gravity. The common causes are nervous hydruria or the ingestion of fluids such as beer ; but another cause is chronic interstitial nephritis, and there the importance lies from an insurance point of view. Care must be taken to eliminate the latter by repeated examinations of the urine. In this group the risks were taken while the solids were persistently low. The number of exposures was 7401. The probable claims on the American experience table was 68, the actual claims 34, giving of expected claims 50 per cent by number and 60 per cent by amount on American experience. Of the 34 claims, only 4 had any direct or indirect relation to the urinary tract.

GROUP 5.—*Slightest possible trace of albumin. Low specific gravity. Relatively low urea Excess of leucocytes and neck-of-bladder and*

urethral cells. Some squamous epithelium. Rarely a blood-globule. No casts.

The urine is like Group 2, except in the relatively low content of solids. The chance of chronic interstitial nephritis is greater than in Group 4. Obtaining samples when the applicant had abstained from liquids was essential. Of infinite help also was the absence of a history or any physical signs pointing to a serious kidney lesion. The insurance risks in this group have therefore been the cause of study to satisfy the author of a reasonable cause for the low solids before issuing a policy, and experience has been satisfactory. The number of exposures was 4348. The probable claims were 41·5, the actual claims 21, making 32 per cent of expected claims on the American experience. Of the 21 claims, 7 causes of death had a direct or indirect connection with the urinary tract.

Group 6.—*Slightest possible trace of albumin. No sugar found. High specific gravity* (1030 *or more*). *Relatively high urea. Occasional blood-globule, few leucocytes and cells from urethra or neck of bladder. Excess of mucin. No casts found.*

This group was introduced to learn the real significance of a concentrated urine, whether temporary or permanent, as an element in longevity. The class of case was like that in Group 2, except that the urine was concentrated. The concentrated urine has an irritating action on the mucous membrane of the lower part of the urinary tract, as indicated by the sediments. The condition is most common in women. The number of exposures was 10,870. Probable claims were 100, the actual claims 42, giving 42 per cent of expected by number and 45 per cent by amount on the American experience. Of the 42 claims, only 6 causes of death appeared to be in any way connected with the urinary system.

Group 7.—*First examination: Slightest possible trace of albumin. Relatively normal solids. Rare or occasional hyaline or granular casts. Occasionally or rarely a blood-globule. Second examination: Slightest possible trace or no albumin. Relatively normal solids. Rarely a blood-globule, excess of leucocytes and neck-of-bladder or urethral cells, or sediment negative.*

These cases were only accepted after repeated examination had shown the kidney irritation to have disappeared. Most were between the age of twenty-five and forty-five. The number of exposures in this group was 4152. The probable claims were 42·8, the actual claims 20, making 31 per cent of expected claims by the American experience. Of the 20 claims, only a few had any direct or remote connection with the urinary organs.

Group 8.—*First examination: Very slight trace of albumin. Relatively normal or high solids. Few hyaline and granular casts with renal cells and blood adherent. Subsequent examinations* (*after three months*)*: Slightest trace of albumin, relatively normal solids. No casts found. Rare or absent blood-globules or leucocytes.*

Here there was marked renal disturbance, as shown by the albumin

and a good number of casts, some of which had blood and renal cells adherent. The condition of the kidneys might be a somewhat severe irritation or a chronic disease with a mild active or acute condition superimposed. The cases were treated as probably temporary derangements, and were reconsidered after a few months. If the urine was then normal, or showed only a slight local disturbance below the kidneys, the risks were accepted. The number of exposures was 818. The probable claims were 7·1 on the American tables. The actual number amounted to 1, giving 14 per cent of the expected by the American table. The urine in these cases varied very much from week to week. Where the improved condition was not found constant, the cases were not accepted for assurance. Although the figures are satisfactory for the ten-year period, the author points out that the risks must be accepted with great care.

Group 9.—*First examination: No albumin. Relatively low solids. No casts, blood, or other morphological elements. Subsequent examinations: No albumin. Relatively normal solids. No casts, blood, or other morphological elements found.*

Most of the cases were between twenty-five and forty years of age. The departure from the normal was the low content of solids. The number of exposures was 1177. The probable claims were 12·4, actual claims 9, or 72 per cent of the expected. Only 3 of the deaths were in any way connected with the urinary tract.

Group 10.—*First examination: Slightest possible trace of, or absent, albumin. Relatively normal solids. Sugar present, varying from very slight trace to large trace. Occasionally or rarely a blood-globule or excess of leucocytes and neck-of-bladder or urethral cells. Rarely a hyaline and granular cast, or no casts found. Subsequent examinations: Slightest possible trace or absent albumin. Relatively normal solids. No sugar found by copper or phenylhydrazin tests. Occasional or rare blood-globule. Excess of leucocytes or neck-of-bladder or urethral cells. No casts found.*

In this class there was evidence of some degree of disturbance of the urinary tract due to irritating action of the sugar. Such cases were never granted assurance while the urine showed the presence of sugar, but were postponed for a number of weeks or months with the belief that the glycosuria was temporary. When, after a number of examinations at different times of the day, the sugar was proved absent, policies of insurance were given on the regular plan. Very few of these were given insurance if they were heavy weights or if they were in any other way impaired, and particular attention was given to the age, very few being accepted below the age of twenty-five. As a class these cases have shown unusually high mortality up to the eighth or ninth year of exposure; why, it is difficult to explain. Very few died of diabetes mellitus. A disturbance of carbohydrate metabolism seemed to have produced a lower resistance to acute disease. The number of exposures was not large—1394. The probable claims were 13·5 on the American experience table,

the actual claims 8, making 59 per cent of the expected. Of the 8 claims, only 2 causes of death were in any way connected with the urinary system : there were no deaths as the result of diabetes.

Taking the figures all over, the risks having urinary impairments are more than 5 per cent under the average for all ordinary risks for the corresponding period of time. The author admits that the figures are rather astounding. A percentage a trifle above the average was expected, and it is possible that in fifteen to twenty years of experience a percentage somewhat above the average will obtain.

The paper is illustrated by a large number of tables.

Reference.—[1]*Med. Rec.* 1915, ii. 903.

UROBILIN, TEST FOR. *Herbert French, M.D., F.R.C.P.*

A. Edelmann[1] describes a modification of Schmidt's urobilin test which is applicable to both urine and fæces, and which is much quicker than the original test. The technique for applying the test to the urine is as follows : Two reagents are necessary : (1) A concentrated alcoholic solution of bichloride of mercury ; (2) A 10 per cent alcoholic solution of zinc solution and amyl alcohol. About 10 c.c. of urine in a test-tube are treated with half the volume of concentrated alcoholic sublimate solution, mixed, and then shaken with amyl alcohol (which is best accomplished by pouring the contents down the wall of a second test-tube several times). To the clear amyl alcohol layer which quickly separates above, several cubic centimetres of the alcoholic zinc chloride solution are added ; or the amyl alcohol may be poured into another tube and treated with zinc chloride. With large amounts of urobilin the amyl alcohol is saturated with the pigment and shows a beautiful rose-red colour (only with pathological amounts of urobilin), and the addition of zinc chloride produces an intense green fluorescence. With small amounts of urobilin, if the fluorescence is not visible with diffuse light, the light may be focussed on the tube with a convex lens, or the light from a small electric flash may be employed. By this means traces of urobilin may be detected. In applying this test to the stools, several grammes of fæces are rubbed in a mortar with a very small amount of water. Then an excess of reagent 1 is added, and the mixture is rubbed a minute longer and filtered into a clean test-tube. To the filtrate, which is red in the presence of urobilin, the addition of a few c.c. of solution 2 causes a green fluorescence.

References.—[1]*Wien. klin. Woch.* 1915, xxviii, 978 (*Amer. Jour. Med. Sci.* 1916, i, 904).

URTICARIA TUBEROSA OF WILLAN.

E. Graham Little, M.D., F.R.C.P.

This is a group of diseases recognized by Willan, and almost forgotten since he wrote of it, in which the urticarial effusion is so limited that it does not present the characteristic features of either an urticaria

or angioneurotic œdema, and consequently is often mistaken for a rheumatoid affection, with which it has probably no connection. It is a rare type. Nixon[1] has collected four cases.

Willan says of it: "Many of the wheals increase to a large size, forming hard tuberosities, which seem to extend deeply into the muscular flesh, and occasion a contraction in the sinews, with total inability of motion and a sensation of pain in the bones. These tumours are usually whitish at their tops: they rise on the arms, thighs, loins, and calf of the leg, and are very hot and painful for several hours. The eruption, in all cases under my observation, took place at night, and before morning it wholly disappeared, leaving the patient weak, languid, and sore, as if he had been bruised or had undergone much fatigue."

Nixon gives the following clinical picture of the disease, of which he has had so exceptional an experience. "Age affects its incidence little if at all. The sex distribution shows that, in common with other forms of angioneurotic œdema, females are somewhat more prone to be affected. A characteristic attack is marked by the sudden rapid development of subcutaneous or deep-seated swellings, varying in size from nodules as large as peas to tumours as big as oranges. They are multiple and distributed about the extremities, especially the fingers, hands, wrists, feet, and knees, occasionally about the loins and the back of the shoulders. These nodules rarely involve the skin, which, as a rule, shows no discoloration: but they appear to select fascia, tendon sheaths, and peri-articular tissues. The swellings are unaccompanied by a true cutaneous nettle-rash. They are hard, or, if large, may give rise to the sensation of deep-seated tense fluid swellings, pitting subcutaneously on prolonged pressure. Movement of the limbs involved may be stiff and painful. Sometimes the fingers are the seat of diffuse swelling, not situated at the joints but between them, giving rise to a fusiform appearance which at first sight resembles rheumatoid arthritis, but is distinguishable therefrom by the presence of an apparent constriction over each joint.

"The subjective sensations complained of, in addition to aching pain and stiffness, are tingling and burning, but rarely itching. The nodules usually occur at night and disappear before morning, or they may be even more evanescent, lasting only a few hours. The patient is left weak, languid, heavy from want of sleep, and tired as if bruised. As a rule, there is no pyrexia, and the pulse-rate is not increased.

"Bearing in mind that the condition is commonly diagnosed as rheumatoid arthritis or some form of chronic rheumatism, it is important to note that there is no tendency to permanent damage of the joints. There is no grating or creaking to be felt, and no rarefaction, erosion, or osteophytic growths are discovered by *x* rays. The joints do not become fixed or deformed, and in the hands no deflexion of the phalanges results even from repeated attacks.

"The patients are healthy and well nourished, ready and able to exercise as soon as the swellings have disappeared. Sometimes, in-

deed, exercise seems to disperse the swellings and remove the sensation of stiffness. Rubbing and even vigorous massage may actually conduce to a feeling of ease and comfort. Distention of the joint capsule with fluid does not seem to occur, although bursal effusions may be present.

"Cardiac complications are conspicuously absent; so too are organic nerve lesions and wasting of muscles.

"The distribution of the swellings is not symmetrical, nor does it correspond with nerve or segmental areas."

Vomiting or diarrhœa may precede an attack, and there is some probability of a digestive causation. Rapid recovery from the individual attack is the rule. Recurrences are common. Permanent injury does not result.

TREATMENT.—It is essential to recognize the urticarial nature of the disease, and to reassure the patient as to the future. Regular administration of **Calcium** or of **Magnesia** may ward off attacks, and the best means of cutting short their duration is to submit to a diet of bread and butter and water for the period of onset. Free purging with **Calomel** or **Blue Pill** followed by **Epsom Salts** is the safest medication. Hypnotics are contra-indicated, and salicylates, colchicum, and the iodides are all useless.

REFERENCE.—[1]*Quart. Jour. Med.* 1916, Apr., 245.

UTERUS, NEW GROWTHS OF. (*See also* X-RAY AND RADIUM THERAPY, pp. 47, 50.) *W. E. Fothergill, M.D.*

Sarcoma.—This is not a common condition, but its recognition is important because of its bearing on prognosis. Bland-Sutton has said that no uterine operation is attended by so little permanent success as hysterectomy for sarcoma: but a certain proportion of the growths we clinically term 'fibroids' are sarcomata, and it is as well, for the credit of the operator, that these cases should not escape early recognition. J. B. Hellier[1] describes four cases illustrating (1) Sarcoma of the endometrium; (2) Sarcoma of the uterine wall; and (3) Vesicular sarcoma of the cervix. The first variety is to be kept in mind when dealing with cases which present the characters of cancer of the corpus uteri or of degenerated submucous fibroids. The second variety is diagnosed as an ordinary fibroid, but its nature may be suspected at the time of operation and is proved by microscopic examination. Cases of the third group are probably recognized at sight. Hellier concludes as follows: "Sarcoma uteri is mainly a disease of advancing years, being most common just after the menopause, but no age is exempt, for it is even occasionally seen in young children. The symptoms are so uncertain that it may not be possible to make a diagnosis from them alone. Sarcoma, however, grows more rapidly than myoma, and tends to cause more pain and may also cause ascites. Often it produces but little menorrhagia, and the fact that a uterine tumour is accompanied by more anæmia and sallowness than a myoma of corresponding size might be expected to produce is itself suggestive

of malignancy. As the disease advances it is liable to cause metastases. These are most common in the lungs and liver, then in the intestines, omentum, and retroperitoneal glands, but they may occur in any part of the body, including the bones. Submucous or endometrial growths bulging into the uterus or forming large soft necrotic polypi, especially when such recur after removal, are very likely to prove sarcomatous. Sarcoma uteri has sometimes produced inversion, and should be reckoned amongst the causes of non-puerperal inversion. Sarcoma may cause hæmatometra and pyometra. The infiltration of the cellular tissue may be marked, but the disease does not seem to involve the ureters so frequently as carcinoma does. The disease usually runs a rapid course. About half the cases die from metastases, more than a quarter from septic processes. Other rarer causes of death are nephritis and uræmia, obstruction of the bowels, embolism, and accidental complications. The malignancy varies with the structure of the tumour. Round-celled sarcoma is more malignant than cases where there is a well-marked formation of spindle cells."

Myoma.—A. Stein[2] reviews the results of the **X-Ray** treatment of uterine myomata. He thinks that the most important objection to this line of treatment is based on the facts that a certain definite proportion of the cases diagnosed as myomata are really sarcomata, and that carcinomatous growths occur in uteri which also contain myomata. In view of the danger of delay in the presence of malignancy, the enthusiastic claims in favour of *x*-ray treatment call for very close investigation of the actual facts. Klein estimates the proportion of sarcomata amongst growths removed as myomata at 7·7 per cent. In the opinion of v. Herff and most other authorities, the effect of *x*-ray radiation upon the retrogression of myomata is exclusively indirect and due to damage done to the ovaries. Thus the treatment is unsuitable for cases in which future pregnancies may reasonably be hoped for. The treatment also involves the danger of very profuse hæmorrhage which may actually threaten life. Cases are recorded in which myomata have greatly increased in size under radiation, and many have come to operation after radiation has failed.

A further point is the difficulty of definitely diagnosing myoma. Inflammatory masses have been radiated ; also a fœtus encapsuled in an ectopic gestation sac would have been treated in this way had not the patient herself preferred operation.

The *x*-ray treatment is in all cases merely tentative, and in many cases it injures the patient's chances if the case comes to operation finally. There is loss of time. The hæmorrhage is often increased, the patient's general health is frequently impaired, and adhesions are said to form in some cases. The occurrence of intestinal lesions seems to have been definitely established, with diarrhœa and emaciation as results.

The treatment is of long duration and expensive as compared with operation. It acts through destruction of the ovarian function, and, when this is not desired, is contra-indicated. When the ovarian

function has already ceased, it is equally inapplicable. Further, the myoma which has been reduced in size by irradiation remains liable to all the accidents which may happen to these growths. The various degenerations can occur, there may be infection and suppuration of the tumour, it may undergo necrosis, it may cause pressure symptoms such as retention of urine, and it may undergo malignant change. Thus the patient's life is still in danger, though her symptoms may have been relieved. Stein quotes numerous cases, and gives the published opinions of several authorities. He concludes that it is superfluous to comment further on the disadvantages of *x*-ray treatment for myomata. Its indications are limited to patients suffering from diabetes, obesity, advanced arteriosclerosis, or hæmophilia, in whom surgical interference involves danger to life.

Carcinoma.—D. C. Balfour[3] discusses the relative merits of operations for cancer of the uterus. For the encouragement of operators, he points out that 40 per cent of persons dying from cancer of the cervix show no evidence of metastasis, but perish from septic intoxication. Further, he states that cancer has often been spread as a direct result of traumatism at operation, which can be avoided if sufficient care be taken. Balfour considers that early cases of cancer of the cervix are best treated by thorough cauterization of the cervix, followed by total abdominal hysterectomy. But if the patient is a poor surgical risk and has a wide vagina, he prefers vaginal hysterectomy by the clamp and cautery method. In more advanced cases he advises cauterization by the Percy method, with or without ligation of the internal iliacs, followed if suitable by abdominal hysterectomy some weeks later.

I. H. Boldt[4] compares the value of 'red' **Heat** with that of heat which desiccates but does not char or carbonize the tissues, in cauterizing cancer of the uterus. He considers that, whatever the degree of heat used, the patient's abdomen should be open, and a hand belonging either to the operator or to a competent assistant should be kept in the patient's pelvis throughout the operation to direct and control the action of the cautery. A water-cooled vaginal speculum should also be used, in order to protect the vulva and vagina from burning. Percy's claim for the heat which merely desiccates was that, if applied for a long time, such as two hours, its detrimental effect upon cancer cells extended for a considerable depth beyond the surface to which the cautery was applied. Boldt, however, 'desiccated' the tissues for two hours and a half in one case; and the operation being followed by sloughing of the bladder, the patient died of sepsis on the eighth day. Thus he was able to obtain the organs for microscopic examination, and he gives an elaborate pathological report, signed by R. M. Taylor, and well illustrated. This shows that the effect of prolonged exposure to low heat is merely superficial, and is no better from the therapeutic standpoint than the result of a short exposure to a 'red' heat. With the cautery heated to a dull cherry-red, Boldt urges that the operation can be finished in twenty minutes, as against the two

hours occupied when Percy's low temperature cautery is employed. He gives Percy credit for introducing control by the hand within the pelvis, and for improving water-cooled specula. Further, he finds that when the charred eschar has been thrown off a week or two after the operation, a secondary desiccation by low heat and without reopening the abdomen presents great advantages. Boldt has not a high opinion of the value of radium, but says that if it is employed after cauterization, "it can do no harm if properly used, and it may be of much benefit."

S. M. D. Clark[5] recommends a combination of cauterization with the ligation of both the internal iliacs and one of the ovarian arteries. Like other operators, he had seen fatal hæmorrhage following the separation of the slough from a cauterized carcinomatous cervix. He therefore tried the effect of ligation of the arteries as a preliminary to cauterization carried out with the hand of an assistant in the pelvis. He claims for this 'combination method' that it (1) Prevents secondary hæmorrhage; (2) Retards the growth by starving it; (3) Gives access to the glands at the bifurcation of the common iliac which can be removed for examination; (4) Is a good preliminary for a subsequent abdominal hysterectomy, as it lessens operative hæmorrhage; (5) Hastens the separation of the slough produced by the cauterization.

The technique advised is as follows: Open the abdomen and put the right infundibulopelvic ligament on stretch, incise the peritoneum over the bifurcation of the common iliac, and remove the gland there situated for microscopic examination. Free the internal iliac from the ureter and the vein, and tie it. Do the same on the left side, reflecting the sigmoid, if necessary, to gain access to the bifurcation of the common iliac. Tie one ovarian artery. Then, with a hand in the pelvis to guide the cautery, apply the hot iron for twenty minutes through a water-cooled vaginal speculum. In early cases do not close the abdomen, but go straight on and complete the operation at one sitting by abdominal panhysterectomy.

In more advanced cases, close the abdomen after the ligation and cauterization, and wait from three to five weeks, after which time many cases will be found to have become operable and suitable for abdominal hysterectomy. Those which remain inoperable have had the best treatment they could have received. Clark mentions that in five advanced cases vesicovaginal fistulæ have followed the action of the cautery; but he does not say how many cases he has treated, and he grants that five years must elapse before the end-results can be computed.

Howard A. Kelly and C. F. Burnam[6] report on 213 cases of cancer of the uterine cervix and vagina treated with **Radium**. Of these, 14 were operable, the rest being either inoperable or recurrent inoperable cases. Of the operable cases, 10 were treated by operation and radium, and 4 by radium alone. They are all alive and well, but in none of them has five years elapsed as yet. Of the 199 inoperable cases, 53 have been 'clinically cured,' 109 have been improved, and 37 not

improved. The 'clinical cures' have lasted as yet: 1 for six years; 3 for four years; 4 for three years; 5 for two years; 29 for one year, and 15 for six months. The word 'cured' is to be reserved for cases that have remained well for five years and over. The authors express great satisfaction with their results, on which they expect to improve in the future. They advise, in early operable cases, hysterectomy followed by radiation. In border-line cases radium is to be used, and if the growth disappears, the question of operation remains to be decided. Inoperable cases which become operable under radium, but do not heal entirely, should be treated by operation. Inoperable cases which are clinically cured by radium are probably best left alone.

The authors further insist that radium can be and should be used without causing any local or general injury to the patient. The paper contains some technical and pathological matter, but its most striking feature is its optimism.

H. Schmitz[7] reports on 112 malignant growths treated with radium. The growth was uterine in 36 of the cases. The treatment was more vigorous than is usual, and the writer tried an 'intensive' method in certain cases, concentrating as much radiation into as few hours as possible. He found that the desired result was not secured any more quickly by this method, but that the associated symptoms were "exceedingly stormy"—"loss of weight, strength, and appetite, with hyperpyrexia, obstinate vomiting, profuse diarrhœa, and obstinate dysuria. Destruction, ulceration, or necrosis of the tissues was of regular occurrence. Repair of these defects was slow." "Fistula formation—vesicovaginal, rectovaginal, or even intestinovaginal—occurred in ten cases." The writer considers that inoperable cancers that are not advanced too far for cauterization "yield satisfactorily to radium therapy." "Advanced inoperable and recurrent cancers are ordinarily refractory towards the radium rays. Any improvement is at least very temporary."

Schmitz,[8] writing on the same subject, brings his results up to April, 1916. Continued experiments with modified technique appear to have raised his opinion of the value of radium, and he concludes that the results of radium therapy in inoperable and recurrent cancers surpass those of any other known therapeutic agent.

References.—[1]*Clin. Jour.* 1915, Dec., 117; [2]*Med. Rec.* 1916, i, 991; [3]*Surg. Gyn. and Obst.* 1916, i, 529; [4]*Amer. Jour. Obst.* 1916, Jan.: [5]*Jour. Amer. Med. Assoc.* 1915, ii, 1171; [6]*Ibid.* 1874; [7]*Ibid.* 1879; [8]*Surg. Gyn. and Obst.* 1916, ii, 191.

UTERUS, PROLAPSE OF. (*See* Genital Prolapse.)

VACCINATION, PEMPHIGOID ERUPTIONS AFTER.

E. Graham Little, M.D., F.R.C.P.

Mook[1] records a series of eight cases of a bullous eruption, coming on from three or four days to four months after vaccination, and lasting a few weeks or becoming chronic as a recurrent eruption resembling dermatitis herpetiformis. Rise of temperature at some time or other

in the course of the illness was constant, and varied in degree. Death occurred in some of the cases.

"The lesions show a predilection for certain areas, localizing around the mouth, neck, extremities, and especially the joints. The pemphigoid variety may appear as small vesicles, resembling chicken-pox and small-pox, or as papulovesicles, and may become pustular. The bullæ are usually clear and tense on normal skin, although they may be on inflamed and eczematoid areas; of great variety in sizes, forms, and configurations in the same individual. Hæmorrhagic bullæ are frequent. Circinate and concentric rings of bullæ are marked features. In some cases the central bulla is hæmorrhagic, with concentric serous vesicles and bullæ, and not necessarily intercommunicating. Others have a tendency to the production of large gyrate patches of peculiar inflammatory areas, resembling mostly eczematoid dermatitis."

Inoculation experiments negatived the possibility of the existence of a generalized vaccinia, or of foot-and-mouth disease. The closest similarity of this affection is with the acute septic pemphigus of butchers; but cultures of the vesicles either proved sterile, or grew *Staphylococcus albus*, which was regarded as certainly an accidental infection.

A mild or marked leucocytosis was always observed. Only one of the eight cases recorded was a female, and this preponderance of this affection in males has been noted as characteristic. The causation remains obscure.

[Post-vaccinal eruptions have frequently been explained as streptococcic infections, and it is noteworthy that in this series the cultures seem to have been made on solid media on which streptococci do not grow readily, or are apt to be swamped by staphylococci. In one instance in which smears were taken, abundance of streptococci was noted.—E. G. L.]

Reference.—[1]*Jour. Cutan. Dis.* 1915, 667.

VARICOCELE. *J. W. Thomson Walker, M.B., F.R.C.S.*

Del Valle[1] describes a new operation for varicocele. An incision is made over the external abdominal ring, and the constituent parts of the cord are exposed. The veins are dissected from the external ring to the testicle, and usually five or six veins are found dilated. The veins are separated into anterior and posterior groups. A catgut ligature is tied round the posterior group, one finger breadth above the testicle, and another ligature of silk is tied round the anterior group, two finger breadths above the level of the catgut suture, and left long. An incision, 4 cm. long, is made through the external oblique fascia, parallel to and one finger breadth above the internal pillar of the ring. A pair of forceps are passed through this incision, and through the conjoint tendon, and appear at the external ring. The ends of the silk ligature are grasped in the forceps, and the anterior group of veins drawn through the opening, raising the

testicle, and are fixed by means of the silk ligature. The ends of the incision in the fascia are sutured, forming a bridge beneath the loop. By this means the circulation in the venous group affected is said to be diminished without being suppressed, the testicle is suspended by this group of veins, and the muscles of the abdomen produce a constant elastic pressure in the veins.

REFERENCE.—[1]*Surg. Gyn. and Obst.* 1916, i, 734.

VARICOSE ULCERS. *W. I. de C. Wheeler, F.R.C.S.I.*

In a recent article[1] the following treatment is suggested. The ulcer must be cleaned up and stimulated, either by curetting or by the application of a strong solution of silver nitrate. The chronic passive congestion must be eliminated as far as possible by the application of a firm supporting bandage.

Skillern[2] elaborates these points. He recommends the rubber-tissue-dry gauze-muslin-bandage method. In selected cases the calomel-adhesive-plaster strapping method cures rapidly and efficiently; while for routine treatment of the average case, Unna's zinc oxide-gelatin-paste stocking serves as an efficient support. The tendency to healing has been established when the base of the ulcer is covered with healthy, red, vigorous granulations, and when the epithelial edge becomes broader and assumes a pale, bluish-white tint.

(*See also* **Intramine** (p. 19), and **Keritherapy** (p. 20).

REFERENCES.—[1]*Med. Rec.* 1916, i, 741; [2]*Ann. Surg.* 1916, Feb.

VAS DEFERENS AND SEMINAL VESICLES, SURGERY OF. (*See also* EPIDIDYMITIS.) *J. W. Thomson Walker, M.B., F.R.C.S.*

The surgery of the vas deferens is discussed by Ashcroft.[1] The following conditions are enumerated as being benefited or cured by surgical treatment of the vas: seminal vesiculitis, epididymitis, diseases of the ejaculatory ducts, and sometimes, posterior urethritis. A simple vasostomy will, he believes, do much to relieve, and often cure, general systemic conditions depending on a focal infection. A longitudinal incision into the vas opens the canal, and its patency is tested by injecting a solution of carbol-fuchsin. A solution of 5 per cent argyrol, or 1 per cent protargol, may afterwards be injected, 4 to 8 c.c. being introduced. Ashcroft rarely gives more than three injections. Vasostomy also relieves pressure on the epididymis. This operation has been suggested for tuberculosis by Rovsing, who injects the seminal vesicle every day with a 5 per cent solution of phenol; but Ashcroft prefers epididymectomy, with removal of the vas and seminal vesicle. In acute cases, a simple vasostomy suffices to relieve pressure. Both vasa should be drained at one sitting. When the condition becomes chronic, injection of the seminal vesicles through the vas should be tried before resorting to more radical surgery. For some years Ashcroft has used, with good results, vasostomy and injection of the seminal vesicles (Belfield's operation)

in rebellious cases of seminal vesiculitis in which there are no adhesions, and of so-called gonorrhœal rheumatism. No stricture of the vas follows.

For colon bacillus infection of the seminal vesicles, the same beneficial results are observed.

In *acute epididymitis* he gets good results from vasostomy and epididymostomy. Epididymo-vasostomy (Martin's operation) for sterility is mentioned.

In an important article, Schmidt[2] describes the operation of vesiculotomy and vesiculectomy for *seminal vesiculitis*. In describing the symptomatology of seminal vesiculitis, he adopts the classification of Belfield, who grouped the symptoms as genital, urinary, rectal, abdominal, and systemic. (1) The sexual symptoms consist in painful erections, painful orgasm, premature ejaculation, weak orgasm, impotence, azoospermia, pyospermia, hæmospermia, and epididymitis; pains in the testes, epididymis, groins, or perineum, or in the region of the vesicles; spermatorrhœa is not uncommon. (2) Urinary symptoms include painful micturition, frequent micturition, and dribbling. In advanced cases there is trigone cystitis, and cystitis over the area of the diseased vesicles. Partial or complete retention of urine is not uncommon. (3) Rectal symptoms include itching, fullness, heat, and even pain; anal irritation is not uncommon. (4) Abdominal symptoms are chiefly intestinal in character; appendicitis may be simulated. (5) Systemic symptoms in acute attacks are fever and rigors; involvement of joints and peri-articular tissues occur in acute and chronic cases; 'rheumatic pains' are felt in muscles or bones in any part of the body.

Schmidt warns against rushing into operation before trying all other methods. Many apparently severe cases are cured by persisting in treatment continuously, or at intervals, for some years. In cases with pronounced sexual disturbances as the chief complaint, great care should be exercised in directing an operation. He hesitates where nervous and mental symptoms are present, and if they predominate, he would be inclined to refuse operation. It is advisable to be conservative in all cases, with certain exceptions to be mentioned. A fair amount of treatment is first given; then vasostomy and further treatment, and then a not too prolonged interval of rest; this may, if necessary, be followed by operative interference. Vesiculotomy should always be performed in the acute type of cases. In long-standing cases with marked systemic symptoms, in which there is permanent infiltration, a vesiculectomy should be done. In cases of marked infiltration with bladder symptoms, even without systemic symptoms, vesiculectomy is to be preferred to vesiculotomy. In regard to functional results, Schmidt's impression is that sterility may result, but the question has not been carefully studied. The technique of the operation is discussed.

References.—[1]*Surg. Gyn. and Obst.* (Abstr.), 1916, i, 651; [2]*Jour. Amer. Med. Assoc.* 1916, i, 157.

VERTIGO.

J. Ramsay Hunt, M.D.

Perhaps in the whole domain of medicine there is no subject which seems so vague and chaotic as that of vertigo. Doctors repeatedly speak in a general and indefinite way of 'intestinal' or 'stomach' vertigo, of vertigo from Bright's disease, dizzy spells from refractive errors, from indigestion, or neurasthenia, etc., without thinking even for a moment, of the real mechanism of its production.

Vertigo is a peculiar and definite disturbance perceived within the brain itself, just as sight and hearing are perceived in the brain, and the impulses are transmitted through the vestibular mechanism and its associated paths.

The inner ear consists of two distinct organs, a cochlear portion which attends to the function of hearing, and a vestibular or static portion with equilibration for its function. The static labyrinth consists of a saccule, utricle, and three semicircular canals. The saccule presides over linear movements in a lateral direction, the utricle recognizes linear movement in an anteroposterior direction, and the semicircular canals control rotary or turning movements in all conceivable planes. The semicircular canals have each a bulbous swelling on one end, in which is placed a group of sensitive hair-cells, capable of excitation. The eighth cranial nerve or 'auditory' nerve, so called, conveys impulses from the whole labyrinth, and consists of two distinct parts—the cochlear which carries fibres of audition, and another distinct vestibular portion which carries fibres of equilibration. Perfect equilibration is accomplished through a harmonious co-operation of several special senses, chiefly the static sense, sight, and muscle sense. The static labyrinth has equilibration for its sole function, and is the most important organ for the maintenance of balance and of orientation. Any disturbance of the mechanism of equilibration induces vertigo.

Fisher and Jones[1] discuss this subject. Vertigo is described as a subjective sensation of a disturbed relationship of one's own body to surrounding objects in space. Irritation, or destruction of the labyrinth, or of any portion of the vestibular tracts, induces vertigo, with associated loss of equilibration. Irritation of the ear itself is not the only way of producing vertigo. Various visual disturbances, cardiovascular affections, gastric or alimentary disorders, etc., may exhibit vertigo as a symptom. This, however, is produced by a direct action on the vestibular apparatus. The stomach of itself, or the kidneys, or the heart, etc., can no more produce vertigo than they can produce sensations of flashes of light, hallucinations of sound, or obsessions of smell.

If a person is turned toward the right, with the head in the upright position, with the eyes closed, his first sensation is that of turning toward the right. This is due to the lagging behind of the endolymph in the horizontal semicircular canals. As the turning is continued, the endolymph catches up to the movement of the body, and the

subject no longer feels that he is turning, although actually he is turning. On stopping the chair the endolymph continues to move, and the person has the sensation of turning in the opposite direction, namely, to the left, although as a matter of fact he is sitting absolutely quiet in the chair. This induced vertigo is produced by setting in motion the endolymph in the labyrinth.

Experimental or vestibular vertigo manifests itself in certain definite planes, e.g., sensation of turning in a horizontal plane, either from the right to left or from the left to the right ; sensation of turning in the frontal plane, or rather the sensation of falling to the right or to the left ; sensation of turning in the sagittal plane, or rather the sensation of pitching forward or backward.

Sensation of movement in the horizontal plane is produced by horizontal canal or canals only. This is experienced by the subject when he is turned with the head in an upright position.

The sensation of turning in the frontal plane is produced only when the vertical canals are influenced in that plane. If, after such turning, the head is permitted to remain in the forward or backward position, the sensation that the subject experiences is one of turning in the frontal plane, which in this position of the head is parallel to the floor. As it is a sensation of turning in a plane parallel to the floor, or the horizontal, it is not unpleasant. If, however, the head is then raised to the upright position, the frontal plane now assumes a position at right angles to the floor, and the subject has a sensation of falling either to the right or to the left, which is therefore unpleasant.

The sensation of turning in the sagittal plane is produced only when the vertical canals are influenced in that plane. If a subject is placed in a chair with the head inclined well over toward the shoulder, his head is then in the sagittal plane. If he is turned now with the head in that position, the resulting subjective sensation is one of turning in that same sagittal plane, which, however (in this position of the head), is parallel to the floor. If, after such turning, the head is raised to the upright position, the sagittal plane assumes a position at right angles to the floor, and the sensation is that of falling in the sagittal plane, namely, pitching forward or backward. This is unpleasant.

Seasickness.—This may be considered as being unquestionably an ear phenomenon. Deaf-and-dumb people do not become seasick. Bárány has shown that persons who show no response to stimulation of their ears experimentally cannot be made seasick. Persons who by stimulation of the ears become easily nauseated, also become seasick easily.

Seasickness is therefore an ear phenomenon in which the static labyrinth is disturbed by the unaccustomed movement of the boat or ship. The tossing of a ship may be analyzed as movements in the following planes : the horizontal, the frontal, and the sagittal. Unfortunately the movement of the ship seldom takes place

in one plane only. It is the combination of the various planes which plays havoc with the semicircular canals.

REFERENCE.—[1]N. Y. *Med. Jour.* 1916, ii, 99.

Herbert French, M.D., F.R.C.P.

Vertigo is a common symptom which has varied causes, and consequently treatment is often unsuccessful. A very helpful discussion of the subject has been published by Saundby,[1] giving useful hints as to treatment according to the cause.

Optic Vertigo.—This depends on some defect of vision, and such cases are probably met with more often by eye specialists than by others. The importance of an error of refraction should not be overlooked, and a careful examination of the eyes should be made in all cases of vertigo which present no other obvious explanation.

Gastric Vertigo.—Trousseau described vertigo *a stomacho læso*, but some modern writers have denied its existence, on the ground of the absence of the symptom in such grave diseases as ulcer and cancer of the stomach. But there can be no doubt of its frequency in gastric irritation, e.g., in overloading the stomach, where an epileptiform convulsion may occur, and vertigo must be allowed to be a milder phase of the same effect on the brain. Vertigo is common in so-called 'bilious attacks' or sub-acute gastritis, the consequence of errors of diet or excess of alcohol. This form of vertigo is increased by lying down, and is usually relieved by emptying the stomach. A 'nightmare' may be an attack of gastric vertigo occurring during sleep.

Sufferers from gastric vertigo should be **Dieted** by enjoining abstinence from all fats, including butter; fat meats and oily fish, such as pork, ham, bacon, sausages, veal, salmon, mackerel, herrings, eels, and all fried and greasy dishes; from lobsters and crabs, which are often irritating; from porridge and brown bread, on account of the bran they contain; from seeds and skins of fruits, from salads, mushrooms, pickles, condiments, cheese, all alcoholic drinks, and from Indian and Ceylon teas. China tea infused with boiling milk may be recommended.

Two 5-gr. blue pills should be prescribed—one to be taken at bedtime and the other on the third night; while the following combination may be given in mixture or powder suspended in milk, before each meal:—

R	Bismuth. Carb. Sodæ Bicarb. āā gr. x	Pulv. Rhei	gr. ij

If the bowels are confined, a teaspoonful of effervescing sulphate of soda should be sipped slowly in four or six ounces of hot water on rising in the morning.

Neurasthenic Vertigo commonly takes the form of one of the numerous 'phobias.' Acrophobia is the giddiness so many people experience on a high tower, a feeling produced in some susceptible persons even by thinking of or reading a vivid description of such a position. Agoraphobia is the dread of open spaces, so that the

sufferer cannot without assistance walk across a public square or a large empty room. This form of vertigo is caused by any of the conditions that induce neurasthenia, such as overwork, worry, loss of sleep, prolonged illness, excesses of all kinds.

Cardiac Vertigo.—Cardiac disease is a fairly frequent cause of vertigo where it is associated with imperfect compensation and consequent impaired supply of blood to the brain. In aortic disease the patient often feels giddy on assuming an erect position, either on getting out of bed or on rising from a seat ; but those with feeble circulation from mitral disease also suffer from this symptom. Any condition that involves cerebral anæmia is apt to cause vertigo, such as the various blood diseases, or simple anæmia from loss of blood, or depletion of the circulation from severe purging.

Migrainous Vertigo.—Many cases of vertigo are allied to migraine, and may alternate with typical attacks of that interesting condition ; while others are epileptic in their relations and are truly examples of *petit mal,* although in the absence of any history of the major form their true condition may be missed and the symptom attributed to indigestion. The diagnosis of *petit mal* depends upon the fact, which can be elicited by careful inquiry, that there is a real, although momentary, loss of consciousness. These attacks may occur at such long intervals that treatment by drugs is hardly possible, but the patient's life should be regulated. The diagnosis of migrainous vertigo depends upon the occurrence of recognizable attacks of migraine, which usually have troubled the patient in what he will call bilious attacks or bilious headaches, since boyhood. Saundby has found Haig's diet most useful in the treatment of migraine, and he orders in these cases a **Purin-free Diet,** which means abstinence from animal food, leguminous vegetables, tea, coffee, and cocoa.

Organic Brain Disease may show its presence first by causing giddiness, graver symptoms not developing until some months later. It is not always possible to recognize these cases at first, however carefully the examination has been made ; but there is nothing in this failure with which we need reproach ourselves, and the correct diagnosis will eventually be reached.

Poisons.—Vertigo may be induced by many poisons, notably lead, which in the form of acute lead poisoning causes not merely giddiness but epileptiform convulsions, coma, and death. The only cases of this type Saundby has met with were in the workers at a metallic sign factory, where a lead glaze was being used. After more than one death had resulted, the method of glazing was changed. Minor degrees of poisoning causing vertigo are met with in house-painters, plumbers, and other workers in lead.

Giddiness may be caused by indulgence in substances used for their narcotic and intoxicating effect, such as alcohol, cocaine, cannabis indica, and tobacco, or by drugs such as erythroltetranitrate, or trinitrine, from muscarin in mushroom poisoning, by deficient oxygen in the atmosphere, as on very high mountains, from external heat in

hot rooms or in a hot bath, or from the solar rays (sunstroke). Slight concussion from falls or blows on the head is invariably attended by giddiness.

Intestinal Worms are a well-known cause of vertigo, especially the common round-worm (*Ascaris lumbricoides*). Less familiar in this country is vertigo due to the hook-worm (*ankylostoma*), which plays such havoc with the health of the population in the tropics.

Ménière's Disease occurs in people at and after the middle period of life, and is associated with partial loss of hearing in one or both ears as a consequence of gout, rheumatism, syphilis, or influenza. The diagnosis depends upon the recognition of the auditory defect, and on the exclusion of graver possibilities, or even slight removable conditions, such as accumulation of wax in the ear. The prognosis may always be hopeful as to the ultimate cessation of the attacks. The proximate cause seems to be irritation of the labyrinth from variation in pressure within the ear, the result being reflex vasomotor spasm in the brain. The attacks are naturally the cause of much alarm, especially when the patient falls and loses consciousness; and although death seldom occurs, it is not impossible.

The treatment is unsatisfactory, as there is no rational basis for it, and the intervals between the attacks are so long that it is difficult to estimate the effect of remedies or to persuade the patient to continue their use. **Iodide of Potassium** is the remedy generally prescribed, but it should be watched, and not persisted in if it causes depression. A dose of 10 gr. at bed-time is better and more likely to be kept up than a smaller quantity three times a day. It may be prescribed in water with 20 min. of aromatic spirits of ammonia to each dose. Monobromate of camphor may be tried, prescribed in 'perles' containing 2 gr., to be taken three times a day an hour before meals.

It is noticeable that the etiology of several of these cases is not so simple as the classification might suggest. Gastric symptoms may be present in cases of heart disease or neurasthenia, and successful treatment depends upon taking these factors into consideration when present, and by giving such general directions, diet, and drugs as may remedy all the determining causes. Thus it may be necessary to correct faulty habits, to advise the supply of effective teeth, to regulate diet, or to overcome constipation, in order to complete the cure, even when the main symptom may be undoubtedly due to one of the definite causes above enumerated.

REFERENCE.—[1] *Med. Press and Circ.* 1915, Nov., 484.

VOICE-FORMATION. (*See* LARYNX.)

WARTS. *E. Graham Little, M.D., F.R.C.P.*

C. J. White,[1] in two communications, praises the effect of **Mercury** administered internally in the dissipation of the eruption of multiple flat warts, which are so often resistant to treatment. These are commoner in children than in adults, and consequently are sometimes

distinguished as juvenile; but they are not uncommon in adults, and constitute a very disfiguring condition, as the eruption usually occupies exposed surfaces such as the face and hands. White prescribed pills containing ¼ gr. of **Protolodide of Mercury** three times a day, and in some of his cases a local application as well of **Salicylic Acid** unguent. In ten out of eleven cases the warts rapidly disappeared with this treatment. In the eleventh case, which was of doubtful nature, the method failed.

Reference.—[1]*Jour. Cutan. Dis.* 1915, 738, and 1916, 361.

WEIL'S DISEASE. *Herbert French, M.D., F.R.C.P.*

Many cases of infective jaundice have occurred both sporadically and in epidemic form amongst troops in various parts of the Continent; most such cases are probably not examples of Weil's disease, but a few are; and as this malady is apt to relapse, it has been seen amongst soldiers invalided back from the front. A new discovery in regard to this particular type of infective jaundice is that spirochætes, thought to be the essential cause of the disease, are recoverable from the blood in the early stages; it appears to be a spirochætal jaundice, and search for these organisms affords a means of diagnosing true Weil's disease from other types of epidemic jaundice. Researches upon this point need confirmation, but the existence of special spirochætes appears to be accepted. The organisms can be cultivated from the patient's blood, but only during the first few days of the disease. They have also been demonstrated in the organs post mortem. Jaundice is generally regarded as an essential feature of Weil's disease; but probably it is not essential, non-jaundiced cases escaping diagnosis simply because of the absence of what otherwise first draws attention to the possible nature of the fever.

The clinical features of Weil's disease are summarized by Trembur and Schallert[1] as follows: Prodromal symptoms begin suddenly, and precede the fully developed disease by two to four or more days. They comprise severe frontal headache, lumbar pain, and pain and heaviness in the extremities sometimes extending to the chest and neck muscles, and marked tenderness of the affected muscles to slight pressure. These symptoms are so constant and so characteristic that they alone are often sufficient for diagnosis. In addition, there may be vomiting, epistaxis, slight mucoid diarrhœa, conjunctivitis, pharyngitis, vertigo, and severe malaise. The temperature curve of the disease is irregular. It usually shows one or more recrudescences which accompany an increase in the severity of the symptoms. The respiratory tract is generally involved in a purulent bronchitis, and pneumonic symptoms may occur. There is usually a catarrhal inflammation of the buccal and pharyngeal mucosa, with frequent dysphagia, and vomiting is the rule. The liver is enlarged almost from the first day, and is tender to pressure. Diarrhœa is common at the beginning, and the movements soon become clay-coloured, with a later constipation. There is usually circulatory depression, with a

soft, rapid pulse, reduced blood-pressure, and a tendency to œdema of the dependent parts. Small amounts of albumin, with granular and hyaline casts, are ordinarily found in the urine, and bile pigment is present in all cases. Moderate leucocytosis with relative polynucleosis is the rule. There is also reduction in the number of red cells. Lastly, there is more or less intense jaundice. Prognosis is good, and recovery fairly rapid.

Reference.—[1]*Med. Klin.* 1916, April 16 (*N. Y. Med. Jour.* 1916, June, 1095).

WHOOPING-COUGH. *Frederick Langmead, M.D., F.R.C.P.*

J. F. Crombie[1] refers to the value of a blood-count in the diagnosis. In his opinion a considerable lymphocytosis is found in all cases, and occurs some time before the cough is characteristic.

Garlic recommended (p. 18).

Reference.—[1]*Brit. Med. Jour.* 1916, i, 688.

WOUND INFECTIONS. (*See* Gunshot Wounds and Infections.)

YAWS. *Sir Leonard Rogers, M.D., F.R.C.P.*

Ricono and Mount Fletcher[1] discuss yaws and similar diseases in South Africa, detailing eight cases, and go on to describe a form of granuloma inguinale which resembles yaws. They agree with others in considering **Salvarsan** and **Neosalvarsan** to be ideal remedies in moderate doses of 0·4 grm., while potassium iodide is also useful in accelerating recovery. W. M. McDonald[2] also regards the salvarsan treatment of yaws as one of the greatest advances ever made in tropical medicine, and criticizes Duprey's letter condemning the treatment.

References.—[1]*S. Afric. Med. Rec.* 1916, March, 83; [2]*Lancet*, 1915, ii 649.

Part III.—Miscellaneous.

PUBLIC HEALTH:

INCLUDING

I. MEDICO-LEGAL AND FORENSIC MEDICINE.
II. STATE MEDICINE, INCLUDING LEGAL DECISIONS.
III. INDUSTRIAL DISEASES AND TOXICOLOGY.
IV. SCHOOL MEDICAL SERVICE.

EDITED BY JOSEPH PRIESTLEY, B.A., M.D., D.P.H.
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I. MEDICO-LEGAL AND FORENSIC MEDICINE.

LEPROSY AS AN INFECTIOUS DISEASE IN ENGLAND.

Action for alleged breach of warranty, fraudulent misrepresentation, and conspiracy was brought by a lodging-house keeper against a medical practitioner, a patient's executor, and a patient's daughter—the patient suffering and dying from leprosy. The Jury found that leprosy was infectious or contagious, and that, therefore, the patient was a danger to others and not a fit and proper person to occupy the plaintiff's rooms, and that, consequently, there had been fraudulent misrepresentation on the part of the medical practitioner and the plaintiff's daughter. The damages were assessed by the Jury at £250. The Judge overruled the findings of the Jury, and judgement was entered for the defendants, on the ground that there was no evidence to support the Jury's findings to the effect: (1) That the patient's daughter knew that her father was suffering from leprosy, and (2) That the medical practitioner regarded the disease as infectious or contagious. An appeal against this decision was dismissed.

THE FLORENCE TEST FOR SEMINAL STAINS.

The suspected stained materials are arranged in small pieces on glass slides, and a drop of glycerin solution (1–10) is placed on each piece to soften the material, so that it can be teased out. Florence's reagent is then applied, consisting of iodine 2·54 grms., potassium iodide 1·65 grm., and distilled water 30 c.c., and a cover-slip placed over each piece of suspected stained material. Under the microscope with a $\frac{1}{6}$-in. lens, dark-brown crystals in the form of rhombic platelets resembling hæmin crystals will be seen if the stains be seminal—the crystals being seen either in the coloured liquid or in the meshes of the cloth. If the stains be non-seminal, no such crystals will be found. Other confirmatory tests should be applied. (See *Extra Pharmacopœia*, vol. ii.)

Right of Patient to Prescription.

A patient demanded from the chemist the return of a medical man's prescription, but was refused. An action was entered against the chemist in the County Court, and the Judge *held* that there was no property in the prescription given by the medical man, but that such prescription was only given to the patient to take to the chemist to save the medical man the trouble, and that, consequently, the patient had no claim to the document. The action was dismissed with costs.

Workmen's Compensation Act.

Rheumatism as an Accident.—A miner engaged in a colliery as a brusher was sent down the mine to assist in baling out water, which had accumulated in the pit bottom on account of the water-pump having broken down. He was working in water up to his chest for a period of eight hours, with the result that he developed rheumatism (subacute) afterwards. The Sheriff Substitute decided that the rheumatism was an injury caused by accident "arising out of and in the course of" employment. The firm (Glasgow Coal Company Limited) appealed from the Second Court of Session to the House of Lords, and the verdict of the Sheriff Substitute was upheld and the appeal was dismissed.

Riding a Bicycle to and from Work as an Accident.—A magistrate's clerk was killed by being knocked off his bicycle by a motor-car whilst riding from the police court back to his home. It was *held* by the County Court Judge that, under the Act, the accident arose out of his employment, such employment extending to the employé's home, from and to which he had to travel from his work. The decision is an important one, even though only a verdict of a County Court Judge at present.

II. STATE MEDICINE, INCLUDING LEGAL DECISIONS.

Venereal Diseases.

The Report of the Royal Commission on Venereal Diseases was issued on March 2, 1916, being duly signed by all the Commissioners, subject to reservations as to prisoners and Poor Law patients by Sir Kenelm Digby and Canon Horsley. The Commission was appointed on November 1, 1913, and eighty-five witnesses were examined. The terms of reference to the Commission were as follows:—"To inquire into the prevalence of venereal diseases in the United Kingdom, their effects upon the health of the community, and the means by which these effects can be alleviated or prevented, it being understood that no return to the policy or the provisions of the Contagious Diseases Acts of 1864, 1866, and 1869 is to be regarded as falling within the scope of the inquiry." Despite this important proviso, the Commissioners state that no advantage would accrue from a return to the system of those Acts, but that the great improvement as regards venereal diseases in the Navy and the Army has taken place since the repeal of such Acts in 1886. "Better results are likely to be obtained by the diffusion of the knowledge of the serious consequences

of these diseases and the provision of effective treatment for both sexes under conditions to which no stigma is attached "—to quote the words of the Report of the Advisory Board of the Army Medical Service of 1903.

The Royal Commission Report commences with an Introduction, dealing with previous action by the State, and a note on the introduction of syphilis into Europe, and a clinical description of the diseases and the means of transmission, including the successful inoculation of animals by Metchnikoff and Roux. The prevalence of venereal diseases is dealt with in detail by means of statistics presented by Government departments and private persons—the majority of the statistics being unreliable on account of the causes of deaths being masked from fear of hurting the feelings of relatives. Thus, deaths from locomotor ataxia, general paralysis, and aneurysm of the aorta are really deaths from syphilis, but as a rule are not so certified. There is room for much improvement in death certification, and in the keeping of institutional statistics, both of mortality and of morbidity.

The effects of venereal diseases (both syphilis and gonorrhœa) are well set out, not only in so far as adults are concerned, but also in regard to the offspring (hereditary syphilis). Syphilis is a frequent cause of antenatal death, producing abortion, miscarriage, or still-birth, and gonorrhœa is the commonest cause of both absolute and relative sterility in women and men. Hence the serious economic effects of venereal diseases in levying such a heavy toll on the vitality of the nation.

Finally, the Report deals with means of alleviating and preventing the effects of the diseases, under the two headings of: (1) *Diagnosis* and (2) *Treatment.*

1. *Diagnosis.*—Early and accurate diagnosis is necessary, and for this purpose all modern scientific measures are needed—both bacteriological and others. Existing laboratories are to be brought into use, and new laboratories established, where necessary, all laboratories to be subsidized by grants from Imperial funds to the extent of 75 per cent of the total cost.

2. *Treatment.*—Syphilis is a curable disease, and, for that end, the 'intensive treatment' is recommended in the primary stage. The results of treatment of syphilis by mercury, arsenical compounds, salvarsan (or efficient substitutes), galyl, etc., are set out in the Report, as is also the importance of properly treating gonorrhœa. In both syphilis and gonorrhœa, treatment to be efficient must be promptly given and thoroughly administered at financially State-aided (up to 75 per cent) clinics connected with existing hospitals or, if the patients prefer, under their private medical attendants. Notification of venereal diseases (the Commissioners being *against* such notification, at least for the present), detention in hospital of persons suffering from venereal diseases, marriage and communication of venereal diseases, the need for education of medical men in the diagnosis and treatment of venereal diseases, and of the general public in the nature and dangers of venereal diseases, etc., are subjects also dealt with in the Report.

An important opinion is expressed by the Commissioners to the effect that the application of a rule by which sickness benefit may be

curtailed or suspended in the case of venereal diseases on the ground that such diseases are due to misconduct, may deter patients from seeking prompt and efficient treatment, and is, therefore, contrary to the interests both of public health and economy. Few diseases are more amenable to curative treatment than venereal diseases in their primary stages, and, if not so treated, few diseases cause more serious after-effects, e.g., locomotor ataxia, general paralysis of the insane and other paralyses, diseases of the liver and kidneys, stricture, rheumatism, etc.

The Local Government Board, by an Order dated July 12, 1916, has put into operation the recommendations of the Royal Commission so far as the provision for diagnosis and treatment is concerned. Accompanying the Order is a circular letter, addressed to the authorities, setting out the manner in which the new duties are to be carried out—the free provision of laboratory facilities for diagnosis, and of free adequate and skilled treatment for all persons affected. Seventy-five per cent of the cost is to be borne by the Imperial Exchequer, subject to local schemes being first approved by the Local Government Board. Existing pathological laboratories and general hospitals are to be used, and the latter are to be open to all medical students and medical practitioners for the purposes of post-graduate study. Local committees are to be appointed in connection with schemes. Experience shows that the most satisfactory results in the treatment of syphilis in its infectious stages are obtained by periodic injections of salvarsan or its recognized substitutes, with intermediate and supplementary administration of mercurial preparations. In this way, there is a rapid disappearance of local lesions and a consequent minimizing of the risk of the spread of infection to others. In the administration of salvarsan or its substitutes, special precautions are required in the selection of patients, and in the method and frequency of administration, and, consequently, it is proposed by the Board that, for the present, these preparations should only be supplied gratuitously if administered by medical officers of clinics or by medical practitioners authorized by them, i.e., by medical practitioners who are known to have had experience in the administration of such preparations. It is further suggested that medical officers of clinics should, in appropriate cases when requested by medical practitioners, administer these preparations at medical institutions other than the clinics, or at patients' own homes if circumstances so justify.

Preservatives in Food.

Some perishable foods must be preserved: but in what way? The preservative used must, on the one hand, effect its purpose, i.e., preserve the food, but, on the other hand, must prove harmless to consumers. Many suggestions have been offered, such as boric acid, salicylic acid, benzoic acid, fluorides, formaldehyde, sulphites, etc.

A Departmental Committee on the subject of preservatives was appointed in 1899 by the Local Government Board, and reported in 1901, to the following effect:—

1. That no preservative or colouring matter be added to milk.
2. That the use of formaldehyde (or formalin) or its preparations in foods and drinks be prohibited.

3. That the use of salicylic acid be limited to 1 gr. per pint (liquid) and 1 gr. per lb. (solid).
4. That the only preservative to be used in cream be boric acid or mixtures of boric acid and borax in amount not exceeding 0·25 per cent (expressed as boric acid)—the amount to be notified on a label.
5. That the only preservative to be used in butter and margarine be boric acid or mixtures of boric acid and borax in amount not exceeding 0·5 per cent (expressed as boric acid)—the amount to be notified on a label.
6. That in all dietetic preparations intended for invalids or infants, chemical preservatives be prohibited.
7. That copper salts for greening be prohibited.
8. That increased powers of supervision over the use of preservatives be given.

Children, invalids, and persons with weak digestions or kidney disease may be seriously affected, but for normal persons in health the use of a small amount of preservative (at least, of certain preservatives) can do no harm. Hence the difficulty of the problem.

In war time, the use of preservatives becomes an even greater necessity, as perishable foods may have to come long distances, with the additional inevitable delays in transit, and, in addition, there is the important subject of food economy—the prevention of food waste in any shape or form.

The date of the Departmental Committee's Report is 1901; but as yet, up to the end of the year 1916, practically speaking, no legislation has followed on the lines of the findings of the Committee. It is true that, under the Public Health (Regulations as to Food) Act, 1907, the Local Government Board issued in 1912 the Milk and Cream Regulations, under which no preservative may be added to milk intended for sale for human consumption, but boric acid, borax, or a mixture of those preservatives, or hydrogen peroxide may be added, as preservatives, to cream containing 35 per cent or more by weight of milk fat, the mixture to be sold as 'preserved cream.' No preservative may be added to cream containing less than 35 per cent by weight of milk fat, and no thickening substance may be added to any kind of cream, whether containing *under* or *over* 35 per cent by weight of milk fat. Where cream is preserved, such fact must be declared by advertisement and label, giving the name of the preservative used and the amount of boric acid, borax, or a mixture of these used, if such be the preservative added. No standard is fixed by the Regulations, so that the amount of preservative that may be added is a question of fact to be determined by the Court under Section 3 of the Sale of Food and Drugs Act, 1875, and the Court could only be guided by the recommendations of the Departmental Committee mentioned above, viz., 0·25 per cent of boric acid, borax, or a mixture of these (expressed as boric acid). Convictions have been given and upheld on appeal in the cases of Cullen *v.* McNair (cream containing 0·313 per cent of boric acid) and Haigh *v.* Aerated Bread Company (preserved cream containing 0·34 per cent of boracic acid). The only question is whether 0·25 per cent of boric acid will, as a fact, preserve cream for trade purposes.

The Etiology of Cancer.

Many statements have been issued from time as to the suggested etiology of cancer, but no satisfactory explanation has been offered as to the real cause of the disease. The latest work on the subject (both etiological and statistical) comes from America, and it may be useful to draw attention to the conclusions arrived at there on the cancer problem, as follow:—

1. Climate, soil, diet, and habits of life have not been proved to exert any influence on the incidence of cancer; and no country, no district, no race, and no nation possess immunity from the disease.

2. Though the higher animals other than man suffer from cancer, there is no ground for supposing that the disease is acquired from the consumption by man of cancer-infected animals.

3. There is no analogy satisfactorily established at present between the various so-called tumour formations in the vegetable kingdom and tumours (benign or malignant) in the animal kingdom.

4. None of the usual theories as to the cause or causes of cancer, e.g., constitutional, parasitic, cellular, etc., are sufficient to account for the origin of the disease.

5. No reliable sero-diagnostic test for cancer has been found, and diagnosis must rely on the symptoms, aided by a microscopical study of the part affected (if possible).

N.B.—Eight to nine per cent of patients examined prove not to be suffering from cancer on operation or post-mortem examination.

6. Complete surgical removal of the primary focus of cancer is the only hope of cure, cancer being absolutely local in its beginning: and it follows that all possible sources of chronic irritation of organs or parts, or benign new growths (which may be subjected to irritation), e.g. warts, moles, nævi, etc., should be removed.

7. Treatment of cancer by caustics and escharotics, by *x* rays, radium, and mesothorium, and other radio-active agents or electrical methods, by injections of micro-organisms or their toxins, etc., have not proved satisfactory so far, though perhaps an exception may be made in the case of *x* rays, radium, and mesothorium, and other radio-active substances, which appear to be of use in the treatment of certain *superficial* malignant growths.

8. The transplantability of cancer tissue in the lower animals has been proved.

9. All quack 'cures' or remedies are to be avoided, as their use raises false hopes in the patients.

10. Statistically, the following facts are noteworthy:—

i. Cancer is rare under 35 years of age, but frequent after middle life.

ii. The age-incidence varies for different organs of the body, but is practically the same for the same organ in the two sexes.

iii. Women suffer in greater proportion from the disease than men—due to the breast and the uterus being organs specially liable to the disease.

iv. The recent recorded increase in the number of deaths attributed to cancer is due to improved death certification and diagnosis, and may, consequently, be only apparent and not real.

v. Heredity has practically no influence on cancer attacks, and the so-called cancer houses and cancer localities have been disproved, as also has the risk of cancer infection spreading from patients to nurses or others attending upon such patients.

LEGAL DECISIONS.

The following legal decisions, published during 1916, *are important in their relation to State Medicine and Sanitary Administration :—*

Adulteration of Food and Drugs.

Dearden v. *Whiteley* (*King's Bench Division*).

Sale of Food and Drugs Act, 1875, s. 6—*Milk—Interpretation of analyst's certificate—Notice of dilution with water.*

A sample of milk, taken for analysis, was certified by the analyst to be adulterated with (*a*) 18·5 per cent extraneous water, and (*b*) 14 per cent deficiency of milk fat. The sample of milk was sold from a can, which was labelled 'diluted milk,' and the attention of the inspector was called previously to the label. A summons was taken out under Section 6 of the 1875 Act, and the Justices convicted on the ground that the label was a notice only of 'dilution' and not of fat abstraction or deficiency. On appeal, the conviction was quashed, it being *held* that there was no evidence of the abstraction of fat, the deficiency in fat being entirely accounted for by the addition of water. *Appeal allowed and conviction quashed.*

Haigh v. *Aerated Bread Company Limited* (*King's Bench Division*).

Sale of Food and Drugs Act, 1875, s. 3—*Cream—Preserved cream—Boric acid admixture.*

An inspector purchased *preserved* cream which, on analysis, was found to contain 0·34 per cent by weight of boric acid, equivalent to 23·8 gr. of boric acid per lb. The Magistrate dismissed the summons, taken under Section 3 of the Food and Drugs Act, 1875, on the ground that the cream was bought and sold as *preserved* cream, which is admittedly a mixture of cream and boric acid. On appeal, the case was remitted, it being *held* that, though the cream had been bought and sold as *preserved* cream, the Magistrate ought to have convicted, inasmuch as it had been shown that the article had been mixed with an ingredient so as to render it injurious to health.

Appeal allowed and case remitted.

Hunt v. *Richardson* (*King's Bench Division*).

Sale of Food and Drugs Act, 1875, s. 6—*Milk—Deficiency in fat due to particular feeding of cows.*

Sample of milk taken in course of delivery from a farmer was found, on analysis, to contain 2·73 instead of 3 per cent of fat as laid down in the Sale of Milk Regulations, 1901 ; in other words, was presumably deficient in fat to the extent of 9 per cent. There was no evidence to show that the milk was other than as it came from the cows, but that

the poor quality was due to the watery grass and watery green maize upon which the cows were fed. Despite this fact, the Magistrates convicted, on the ground that the milk was not of the nature, substance, and quality demanded. On appeal, this conviction was quashed, it being *held* that the milk was genuine milk from the cow.

Appeal allowed and conviction quashed.

Wilkinson v. *Clark* (*King's Bench Division*).

Sale of Food and Drugs Act, 1875, s. 6—*Milk—Result of analysis of sample taken on the following day admitted as evidence under conditions.*

A sample of milk proved, on analysis, not to be of the nature, substance, and quality demanded, and a summons was taken out against the vendor under Section 6 of the 1875 Food and Drugs Act. The vendor's advocate wished to adduce as evidence the analysis of a sample of the milk taken on the day following that on which the sample, on which the information was based, had been obtained. The Justices rejected this evidence. On appeal, it was *held* that such evidence was admissible to show that the sample, the subject of the prosecution, was not genuine milk from the cow, but that the due weight to be attached to such evidence was entirely a matter for the Justices. *Appeal allowed.*

Morgan v. *Pilchers Limited* (*King's Bench Division*).

Cotton-seed oil used in making cakes and pastries—Breach of contract in supplying unrefined oil.

The cotton-seed oil was sold as genuine refined cotton-seed oil, but contained creosote and phenol, which rendered it unfit for making cakes and pastries. The Jury found that there had been a breach of contract, and awarded damages of £65 (£15 for materials wasted, and £50 for loss of business). *Judgement for plaintiff.*

BYLAWS.

Watson v. *Winch* (*King's Bench Division*).

Norwich Improvement Act, 1879, s. 45—*Local Government Act*, 1888, s. 85 (1)—*Validity of bylaws after repeal of Act under which such bylaws were made—Saving clause necessary.*

Bylaws had been made by a local authority under a Statute, and proceedings were taken under such bylaws after the repeal of the Statute under which such bylaws had been made. The defendant was convicted, and, on appeal, the conviction was quashed and the appeal allowed, it being *held* that the bylaws had lost their validity owing to the repeal of the Statute under which they had been made.

Appeal allowed and conviction quashed.

DRAINS AND SEWERS.

Chelmsford Corporation v. *Bradridge* (*King's Bench Division*).

Public Health Act, 1875, s. 23—*Insufficient drainage—No sewer within* 100 *feet—No existing cesspool.*

Held, that where a house is without a sufficient drain, and there is no existing cesspool or other place to receive the drainage, and there

is no sewer within 100 feet of the house, the owner can be required, by notice under Section 23 of the 1875 Public Health Act, to make not merely a drain but also a covered cesspool or other place to receive the drainage, and that the work can be carried out by the local authority and the expenses surcharged upon the owner, if such notice is not complied with. *Appeal allowed.*

Factories and Workshops.

Thomas Walker Limited v. *Martindale* (*King's Bench Division*).

Factory and Workshop Act, 1901, ss. 62, 152—*Employment of child in cleaning* (*sweeping the floor*).

A child (under 12 years of age) was employed in sweeping a factory floor, and a summons was taken out against the owner of the factory for an infringement of Section 62 of the 1901 Factory and Workshop Act, on the ground that 'sweeping the floor' was included in the word 'cleaning' mentioned in Section 152 of the same Act. The Magistrate convicted and, on appeal, the conviction was upheld. *Appeal dismissed.*

Housing and Town Planning.

Arlidge v. *Hampstead Borough Council* (*Chancery Division*).

Housing of the Working Classes Act, 1890, ss. 29, 32, 33, 49, 85, and *Housing, Town Planning, etc., Act*, 1909, ss. 17, 18, 47, 49, 51, 76—*Closing order—Freeholder unknown—Service of closing order—Service of notice of closing order.*

Notice of a closing order must be served on every owner of the dwelling-house in respect of which it is made, and must be served on the owner personally, and, where the owner or his place of residence is not known and after diligent inquiry cannot be found, the authority may serve the notice by leaving it addressed to the owner, care of the occupier of the house. A sealed copy of the order was left with a woman at the premises, which were then unlet and in the occupation of a caretaker. This procedure was held by the plaintiff not to be a sufficient service of notice of the order within the meaning of the Acts. *Held*, that no distinction was drawn in the Acts between service of an order and service of notice of an order, and that the service in this respect was sufficient. *Held, further*, on the evidence, that diligent inquiries had been made by the defendants for the name and address of the freeholder. *Verdict for the defendants.*

N.B.—An appeal lodged against this decision was dismissed by the Court of Appeal.

Infectious Diseases.

Kitchen v. *Douglas* (*King's Bench Division*).

Middlesbrough Corporation Act, 1914, s. 73—*Permitting to come into contact with infectious body—Not limited to physical touching.*

Held, that the words 'to come into contact' are not limited to actual physical touching, but include such close proximity as to involve risk of infection. *Appeal allowed and case remitted.*

National Insurance.

Moore v. *Insurance Committee for the Borough of Leicester (King's Bench Division).*

National Insurance Act, 1911, ss. 8 (1) (*a*), 15, 62, 65, *and National Insurance Act*, 1913, ss. 30, 32, *and Schedule I—What is legal deduction from amount due to panel doctor on drug account?*

Where a panel doctor orders drugs in excess of what are reasonably necessary for patients, the Panel Committee may investigate the case, and must do so on a representation of the Pharmaceutical Committee. The Panel Committee then reports to the Insurance Committee, which, if satisfied that there has been extravagance, may make such deduction as they think fit from the amount payable to the practitioner (panel doctor) accused and pay it to the credit of the drug fund. Such is the procedure laid down, but there must be a proper 'report' to the Insurance Committee made by the Panel Committee. In the case under review, the Panel Committee simply relied upon a system of average, and it was *held*, that such committee, by so doing, had never addressed themselves to the question of extravagance—had never furnished a proper 'report' to the Insurance Committee on the subject, and, further, that the mere fact that one doctor's order was greater than another's was not sufficient to prove extravagance.

Judgement for the plaintiff.

O'Neill v. *County of Middlesex Insurance Company (King's Bench Division).*

National Insurance Act, 1911, ss. 8 (1), 15 (1) (2), (5), 65, *and National Health Insurance (Medical Benefit) Regulations (England)*, 1913, *No.* 40—*Power of Insurance Commissioners to make regulations as to drugs.*

Alleged over-prescribing by a panel doctor was dealt with by 'report'—a proper 'report,' made by the Panel Committee to the Insurance Committee, and the panel doctor was surcharged in consequence. Against this surcharge the panel doctor entered an action, on the ground that the surcharge was illegal and the Regulation No. 40, under which such surcharge was made, *ultra vires*—every patient being entitled to such treatment and medicine as a panel doctor might prescribe, and an Insurance Committee having no jurisdiction to vary or modify such treatment.

Held, that the regulation was *intra vires*, and that a Panel Committee had power to exercise reasonable control over panel doctors, who should prescribe reasonably according to the available resources of the drug fund, it being understood that there was to be no stinting of proper drugs to panel patients. *Judgement for the defendants.*

Davidson v. *Old Tabernacle Approved Society (Court of Appeal).*

National Insurance Act, 1911, ss. 44 (1), 79—*Married women—Temporary unemployment after marriage—No claim to benefits.*

Held, that under Section 44 of the Act a woman on her marriage was suspended from benefits unless she proved that she had continued to be actively employed under a contract of service after her marriage.

Appeal allowed.

Unsound Food.

Williams and Another v. *Allen* (*King's Bench Division*).

Public Health Act, 1875, ss. 116, 117—*Deposit of unsound meat in place for sale or preparation for sale—Being carried in a cart is in a place for sale or preparation for sale.*

Certain unsound meat was seized whilst being carried in a cart from one place to another. The Justices convicted, on the ground that the cart was a 'place' in which the unsound meat was deposited for the purpose of sale or of preparation for sale within the meaning of Section 116 of the Public Health Act, 1875. On appeal, the conviction was upheld. *Appeal dismissed.*

Webb v. *Baker* (*King's Bench Division*).

Public Health Act, 1875, ss. 116, 117—*Unsound rabbits delivered under contract at an institution are not in the possession of the vendor or consignor.*

Rabbits delivered under contract at an institution were found to be unfit for human consumption, and the local authority seized them for condemnation and destruction, taking out a summons afterwards against the consignor, who was convicted by the Magistrates. On appeal, it was *held* that there was not sufficient evidence to show that the rabbits were in the possession of the appellant.

Appeal allowed and conviction quashed.

Water Supply.

Ilkeston Corporation v. *Fretwell* (*King's Bench Division*).

Water supply for 'farming purposes' does not include a supply for 'domestic purposes.'

A water company contracted by deed of conveyance to supply water for 'farming purposes' and the Justices held that such a supply included a supply for 'domestic purposes' to the house. On appeal, it was *held* that a supply for 'farming purposes' did not include a supply for 'domestic purposes.' *Appeal allowed and case remitted.*

III. INDUSTRIAL DISEASES AND TOXICOLOGY.

Industrial Poisoning.

Aniline Poisoning.—Poisoning occurs in the production of aniline colours, in the compounding of rubber for tyres, and in reclaiming rubber from scrap. Cyanosis is the prominent symptom, and is preceded or accompanied by weariness and sleepiness, flushing of face, fullness in the head, mental confusion, epileptoid convulsions and coma, dryness of the throat, and dysphagia. The cyanosis may increase to a deep purple. The pulse is rapid and weak, the temperature subnormal. Headache, often violent, is common. These symptoms are due to want of oxygen, owing to the formation of methæmoglobin, in which the oxygen is firmly bound, and are followed

by other different symptoms due to the elimination of the poison, e.g., icterus, methæmoglobinuria, bladder irritation, and bronchitis. In the chronic form, due to repeated doses of the poison so small as not to set up the above-described symptoms of acute poisoning, the symptoms are headache, nausea, vertigo, muscular twitchings, disturbances of vision, exhaustion, loss of strength, with a livid or jaundiced skin.

Pure aniline does not cause poisoning, but pure aniline is not used industrially, a mixture of aniline (amidobenzene) with metatoluidin, paratoluidin, orthotoluidin, and xylidin in varying proportions, being employed. Cases of poisoning generally follow the spilling or splashing of the aniline over clothes or skin, skin and lung absorption playing their parts. Preventive measures consist of the installing of exhaust ventilators, or simply the warning of the workmen to seek the open air as soon as flushing of the face and violent headache come on.

Bichromate Poisoning.—The bichromates of potassium and of sodium are extensively used in dyeing, calico-printing, making of chrome yellows and other colours, wood-staining, photography, etc. The workers suffer from 'chrome holes,' which, medically, may be described as sloughs left from the pustular papules of the skin or mucous membrane. All workers do not suffer with equal severity, whilst the bichromate can only attack the skin or mucous membrane when it is broken, abraided, or injured in some way. A papule results, or may result, at the point or points of skin or mucous membrane lesions, the papule becoming first vesicular and then pustular, with the subsequent formation of an ulcer of a very sluggish type—with clean-cut edges, which are also thickened and undermined. The slough is greyish, and in its centre rests a scab. Generally the ulcer is about $\frac{1}{8}$ in. diameter. The sores are found on the knuckles, joints of the fingers, and roots of the nails, on the outer or extensor (not on the palmar) surfaces of the hands, and also, most characteristically, in the septum of the nose (the septum being perforated eventually, as the result). The sores appear on other parts of the body occasionally, e.g., feet and legs, ear, eyelid, anus, etc.

Trinitrotoluene (Munitions) Poisoning.—The symptoms in this are (1) *Irritative*; or (2) *Toxic*. The irritative symptoms may be grouped according to the part of the body affected, e.g., respiratory tract, digestive tract, and skin; and the toxic symptoms may be classified under four heads, viz., digestive, circulatory, cerebral, and special.

1. *Irritative Symptoms.*

a. Respiratory.—Nasal irritation passing from a stuffed and dry feeling to sneezing and running at the nose; smarting, burning, and watering of the eyes; frontal headache; tight, sore, swollen, and burning throat; heavy and 'tight' chest; dry cough, followed by sputum (thick yellow phlegm with a bitter taste).

b. Digestive.—Bitter taste in the mouth, and temporary increase of appetite; abdominal pains (all over) of a spasmodic or griping character, and accompanied by nausea and even by vomiting; constipation, followed by diarrhœa and 'green' stools, with pain and tenesmus.

c. Skin.—Rashes on face, hands, or neck, of a cheiropompholyx type, or discrete red papules on the hands, and a blotchy irregular

erythema, or red papules on the face and neck, with intense irritation and followed by desquamation.

2. *Toxic Symptoms.*

a. Digestive.—'Bilious' attacks, nausea, vomiting, anorexia, constipation, and jaundice, with a dull aching or burning pain behind the ensiform cartilage.

b. Circulatory.—Faintness, giddiness, hot and cold flushes, pallor, palpitation, etc.

c. Cerebral.—Drowsiness, lassitude, and apathy, slight disorders of vision, transient loss of memory, and even, in severe cases, delirium, coma, and convulsions.

d. Special.—Irregular and scanty menstruation, and dark-coloured, scanty urine with occasional scalding on micturition.

Preventive measures suggest themselves, viz., adequate ventilation, the wearing by the workers of overalls and caps, brown or green veils, gauntlet gloves, or suitable respirators (impregnated with some alkaline antidote), the provision of suitable and sufficient food at proper intervals (including fresh milk and cocoa for the workers at the factory on arrival), personal cleanliness, choice of suitable workers, alternate employment (not exceeding eight hours daily) for day-work only, etc. Symptomatic treatment follows the usual lines.

IV. SCHOOL MEDICAL SERVICE.

Enlarged Tonsils and Adenoids.

The more statistics accumulate, the more the dangers to health from enlarged tonsils and adenoids become apparent, with the consequent needs for treatment. In all children, the upper air-passages should be in a normal and healthy condition if the well-being of such children is to be ensured. The nose is the proper inlet for air before it passes into the lungs, thereby ensuring such air being filtered of dust and germs, warmed, and moistened, and enabling it, in consequence, adequately to aerate the blood in the lungs. Any obstruction in the throat or nose interferes with these natural filtering, warming, and moistening processes. Blockage of the Eustachian tubes from such obstruction may also occur, causing deafness, or the presence of such obstruction may even cause defective speech. Catarrh of the bronchi or lungs may follow, with absorption of toxins from chronically enlarged tonsils, causing general debility and anæmia. Enlarged tonsils and adenoids form a nidus for infectious disease germs, e.g., tubercle, scarlet fever, diphtheria, etc. The operation for removal of tonsils and adenoids is a simple one, but must be complete; partial removal is useless.

Verminous School Children.

The more that systematic medical inspections of school children are carried out, the more verminous children will be discovered. In public schools, the proportion of vermin-infected children is very high—especially head lice in girls.

The powers given under Section 122 of the Children's Act, 1908, by which local education authorities can cleanse school children

(vermin-infected) and, in certain cases, take legal proceedings against parents who allow their children to become re-infected after cleansing, are not adequate, wider powers being needed. Cleansing stations should be compulsorily provided by sanitary authorities, and compulsory powers given also for the cleansing of other inmates of vermin-infected houses than school children. Children in a verminous condition can *legally* be excluded from school on the ground that such children are not in a condition reasonably fit to receive instruction in association with other children, and that the verminous condition, being easily remedied, does not constitute a reasonable ground for non-attendance at school of such vermin-infected children (*vide* Walker v. Cummings and Symes v. Brown). The other side of the picture might prove interesting to the lawyers, viz., the *legal* right of parents to prevent their children from attending a vermin-infected school!

THE EDITOR'S TABLE.

Samples (not returnable) and particulars for this section should be sent to The Editor, "Medical Annual" Offices, Stonebridge, Bristol, on or before November 15th.

We are anxious to express no opinion except as a result of practical knowledge, and it is owing to this fact that a notice in the MEDICAL ANNUAL *has come to be valued.*

NEW MEDICAL INSTRUMENTS AND APPLIANCES

We give Inventors and Manufacturers the opportunity of bringing their work before our readers entirely free of cost to themselves, subject only to the following conditions:—

(1) Each article sent for notice must have the novelty or improvement claimed for it clearly stated upon a SEPARATE *sheet or sheets of paper. This should have attached to it any illustration* (WHICH MUST BE SMALL) *for which insertion is desired, and also bear the maker's name. The attention of firms who send a large number of articles for notice is particularly directed to the above condition, as each article has to be sorted into its proper department before it can be considered.*

(2) Medical Inventors should merely describe the instrument or appliance, and avoid giving technique of operations.

The Editor is not able to accept reference to circulars, catalogues, or literature as a compliance with these conditions.

NEW PHARMACEUTICAL PRODUCTS AND DIETETIC ARTICLES.

We are always ready, when a sufficient quantity is sent to us EARLY IN THE YEAR, *to arrange for these to be tested in hospital practice and reported upon; under other circumstances our knowledge is necessarily more limited; but frequently the simple information as to where a particular preparation can be obtained is all the practitioner requires.*

MEDICAL AND SURGICAL APPLIANCES.

Abdominal Belt (The Domen).—We have received the latest model of this belt, which, from long personal experience, we have found the most generally useful in all cases where the abdominal muscles need support. It can easily be combined with a prolapsus uteri support supplied by the same firm. In mild cases of umbilical hernia it is an efficient support, when aided by a suitable pad. It has also proved useful in cases of laparotomy.

It is in enteroptosis that we have used it most frequently and with invariably good results. Domen Belts Co., 456 Strand, W.C.

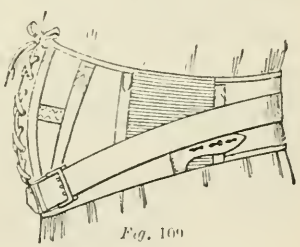


Fig. 109

Amputation Retractor.—This little instrument is the invention of Dr. Collingwood Fenwick, late Surgeon-Major Armée Francaise.

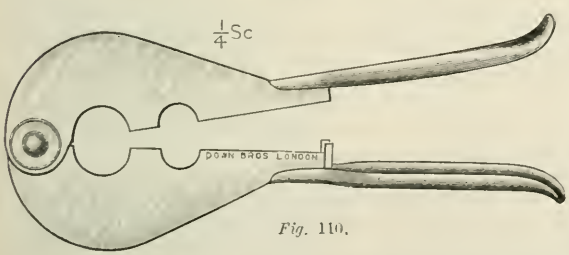


Fig. 110.

The retractor when closed forms a metal disc which retracts and protects the flaps, while perfectly exposing the bone (if there is only one bone) through one of the circular apertures formed by the semicircular notches in the blades;

where two bones are exposed, both apertures are brought into use, and the tissues between the bones are retracted with the rest by the width of metal between the apertures.

The other advantages of this instrument, which has been found extremely useful in the present war, will explain themselves, and its value will be appreciated by those who are called upon to perform amputations where assistance is either limited or unobtainable. It is made by Messrs. Down Bros. Ltd., London, S.E.

Anal Speculum (Bird).—This speculum is of a distinctly novel shape, and we have been careful to test it practically before expressing an opinion in respect of it. We have found it superior to most, in making a general examination of the rectum, because the tissues round the sphincter are prevented from rising up and obstructing the view, as is the case when the slit is carried to the mouth of the speculum.

Fig. 111.

One of the objects of its inventor, Mr. Tom Bird, is to make it self-retaining, and also to prevent it distending the internal sphincter. We consider the point we have called attention to is the chief merit of the design, and we can cordially recommend it to our readers. The Holborn Surgical Instrument Co. Ltd., 26, Thavies Inn, E.C., are the makers.

Artificial Arm.—A new model arm has been designed by Messrs. Alexander & Fowler, Pembroke Place, Liverpool, for cases of amputation above the elbow. The special advantage of this arm lies in the ability of the wearer to bend the arm automatically at the elbow by a forward movement of the stump.

The free to-and-fro movement when walking gives the arm a very natural appearance which cannot be obtained by the ordinary type, which latter hangs and swings straight from the armpit and looks very rigid and stiff.

The mechanical movement of the forearm is obtained by means of a Bowden cable fixed to a loop, passing under the sound shoulder, and fixed and adjusted by a buckle and strap. The forearm can also be fixed bent at different angles by means of the locking device in the upper arm, which enables a book or newspaper to be supported comfortably for reading.

The patent hand with a metal inlay to the two bent fingers renders it possible to carry quite a heavy parcel. The hand can be turned at the wrist and locked in various positions, and is also detachable altogether, so that tools or other instruments may be inserted in its place. We think this will prove to be the best artificial arm yet produced, as so many details have been worked out. Thus the thumb works on a spring, and can be made to hold a newspaper in the most natural way. It costs ten guineas.

'Bipp' Dressing.—In this method of dressing wounds, after thorough cleansing, the whole wound is filled up with the paste, made according to Professor Rutherford Morison's formula, covered with gauze and a sterile pad, and allowed to remain for just so many days or weeks as the patient is free from pain or constitutional disturbance. Messrs. Oppenheimer, Son & Co. Ltd. supply the paste and a pamphlet giving full directions for treatment.

Blood Specimens.—The military authorities use a very simple arrangement for taking blood specimens (*Fig.* 112). An ordinary test-tube is fitted with a perforated cork; a small piece of glass tube is inserted, to which a short length of rubber tubing is attached with a needle mount and a Holborn No. 10 needle. These can be obtained complete or in separate parts from the Holborn Surgical Instrument Co. Ltd., who also have arranged a convenient form of sending blood specimens by post. They supply a strong tin with

lever lid and folding clips, a sterilized needle in a glass tube ready for use, test-tube, corks, etc., as *Fig.* 113. This outfit has been inspected and

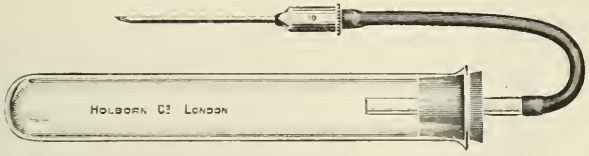


Fig. 112.

passed by the postal authorities as answering all the regulations required for sending pathological specimens through the post. A sufficient quantity

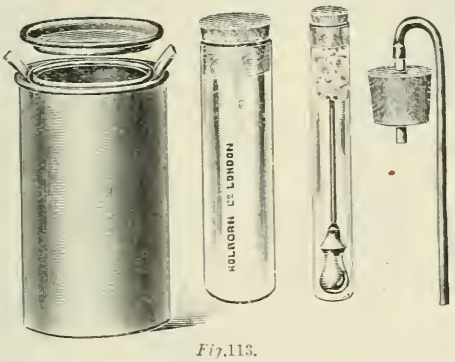


Fig. 113.

of absorbent cotton-wool, or sawdust should be put into the tin to absorb the contents of the tube should it be broken in transit. A special label is supplied with the tin.

Cannula for Intravenous Injections. — This has been designed by Mr. W. F. Cholmeley, Wolverhampton. The inner cannula protects the point of the needle and prevents injury to the wall of the vein. It also prevents the leakage of the solution being injected into the tissues (*Fig.* 114). Messrs. Allen & Hanburys Ltd., 48, Wigmore Street, W.

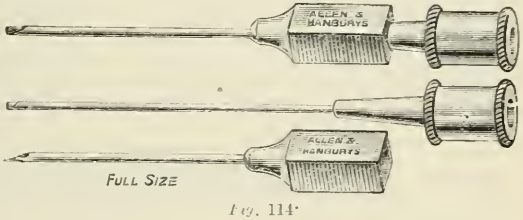


Fig. 114.

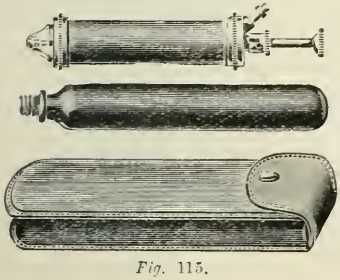


Fig. 115.

CO_2 Apparatus.—For the administration of carbon dioxide snow for surgical purposes (*Fig.* 115). This is a convenient apparatus made by Messrs. Allen & Hanburys Ltd., and costs £3 3s.

Combination Wave Apparatus.—This is being employed with every success in the treatment of stiffened joints.

It is found, under the influence of this form of electric current, that stiff joints can be painlessly exercised. Messrs. Allen & Hanburys Ltd. are the manufacturers, and will supply a descriptive circular on application.

Consulting-room Table.—*Fig.* 116 shows a most up-to-date consulting-room table designed to meet all the requirements of specialists in venereal diseases or bladder complaints. It is fitted with leg and foot rests, waterproof cushions, a sliding trough, drainage, etc. A detachable Valentine's douche and a curtain are also provided. The table can be adjusted to a flat or Trendelenburg position, the latter being most useful when using a direct-vision cystoscope.

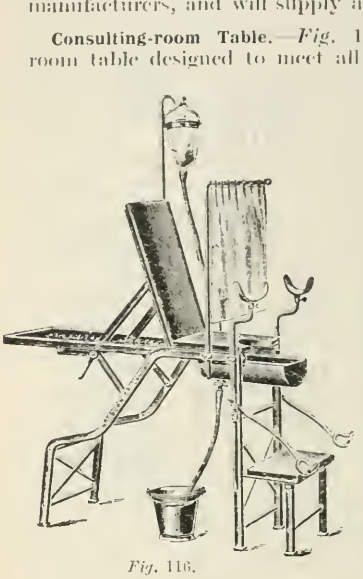


Fig. 116.

The Holborn Surgical Instrument Co. Ltd., Thavies Inn, who are the makers, inform us that several well-known specialists have purchased these tables and speak highly of them.

Celluloid Dressings.—Perforated celluloid (*Fig.* 117) is now used in dressing certain wounds. Captain S. R. Douglas gives the following details of the method employed at St. Mary's Hospital. The celluloid sheet is soaked for a few hours in 5 per cent carbolic solution, then washed in sterile salt solution, and in its softened condition applied to the wound surface and any suitable dressing is placed over it. The celluloid lifts off the wound without causing pain. Discharges pass through the perforations, leaving the surface of the wound clean. While on the wound it regains its original stiffness, forms an accurately fitting splint, and tends to rest the wounded tissue. The Holborn Surgical Instrument Co. Ltd. supply the sheets in two thicknesses, 0·15 and 0·5 mm. The thicker sheets make excellent splints, especially when irrigation forms part of the treatment. A metal framework can be made with ordinary aluminium skeleton splinting and the celluloid attached to this frame.

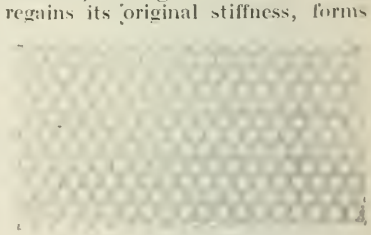


Fig. 117.

Chromo-Radiometer.—This useful instrument has been designed for the accurate comparison of the tint to which the pastille turns under the action of *x* rays. The instrument is so arranged that a measurement of the colour change, and hence of the dosage, can be made in a few seconds. The colour standards are composed of permanent tinted glasses, and are mounted in the circumference of a circle, so that any one of them can be brought into position by turning a milled disc. The instrument is provided with eight colour standards for measuring the fractional dosage of *x* rays.

Accurately standardized pastilles for use with these instruments and with other radiometers have also been introduced, and tests carried out at the National Physical Laboratory to ensure their accuracy. Henry W. Cox & Co. Ltd., 189, Great Portland Street, W.

Drill (Bone). Designed by Mr. R. Jocelyn Swan. As will be seen from *Fig.* 118, this is a very convenient pattern of bone drill, especially when plating the femur. The bow can be used either above or below the cog, and the drill is very rapid in its action.

Sir Arbuthnot Lane uses a drill driven by a bevelled gear, with which he employs the ordinary twist drill, and finds it a great economy of time and labour. Messrs. Allen & Hanburys Ltd., 48, Wigmore Street, W.

'Dropped Wrist' Apparatus.—Designed by Major H. S. Souttar. This is being largely used in the treatment of musculospiral paralysis. The apparatus consists of a stout leather glove into which elastic is fitted to overcome the dropping of the wrist. It is supplied by Messrs. Allen & Hanburys Ltd.

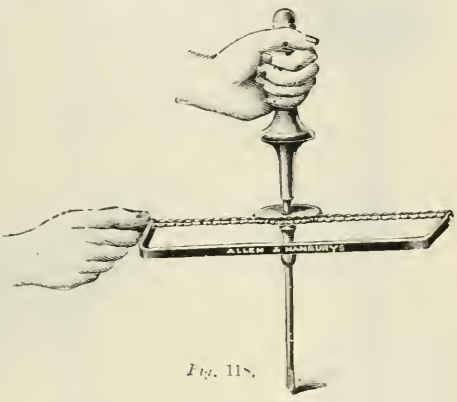


Fig. 118.

Ether, Tube for Administration of.—The above tube has been used for the last year by Dr. Mona Roberts, honorary anæsthetist to the Liverpool Royal Infirmary, in open ether anæsthesia. The tube is modelled upon one employed in the United States, and has been modified by Mr. Blair Bell. It is a flat hollow metal tube, 4½ in. long, and curved to pass comfortably over the tongue into the pharynx; by its means a free and unobstructed airway is established whatever the position of the patient. The patient maintains a bright pink colour, and the respirations are of a gentle whizzing character (*Fig.* 119). Messrs. Alexander & Fowler, Surgical Instrument Makers, Liverpool.

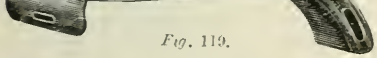


Fig. 119.

Etherometer.—This is a simple contrivance for regulating the number of drops of ether per minute dropped on the under surface of the gauze on the face piece, and which can be regulated as desired. Messrs. Allen & Hanburys Ltd., 48, Wigmore Street.

Forceps (Driver's).—This instrument (*Fig.* 120) is a modified form of Moynihan's pitchfork forceps for holding the edges of a wound together

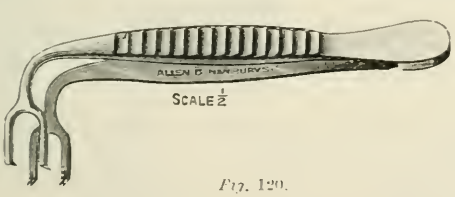


Fig. 120.

during suturing. The handles being bent at a right angle, the hand holding the forceps is out of the line of sight. Designed by Dr. Driver, Orpington. Messrs. Allen & Hanburys Ltd.

Forceps (Skull Flap).—Designed by Colonel Percy W. Sargent. This is an improved pattern made on the model of Houzel's towel-clip. The great advantage of the instrument is that when it is employed a smaller number of artery forceps is required. Further, when the forceps are being employed the edge of the scalp tissue is not damaged. Messrs. Allen & Hanburys Ltd.

Gas Cylinder (N$_2$O Set).—This is a very convenient and portable gas cylinder, made by Messrs. Allen & Hanburys Ltd., measuring only 13 in. and weighing 13 oz. (*Fig.* 121). It contains sufficient gas to fill the ordinary bag three times. It is constructed for use with a telescopic valve, which is easily connected with the gas-bag and weighs only a few ounces.

Fig. 121

Gloves (Rubber.)—Canada is now producing a surgical glove of pure Para rubber. It is quite seamless, and represents the highest grade of workmanship which has been put into this article. The gloves are made in two

Fig. 122.

varieties, quite smooth, or with a surface which gives a firm grip. The manufacturers suggest a method of preserving rubber gloves when not in use, by keeping them in water to which one per cent of carbolic acid or glycerin has been added. Messrs. A. E. Braid & Co. Ltd., 39, Gower Place, W.C., are the sole British agents.

Intensifying Screens (The London).—These intensifying screens for use in connection with *x*-ray plates are of the utmost value. Their quality has been very greatly improved, so that the speed of the operation has been increased until only one-tenth of the normal exposure is required, while the resultant grain on the photograph has been reduced to vanishing point. These screens were practically a monopoly of Germany before the war, but we are glad to say that the 'London' screens are a considerable improvement upon those of German manufacture. Messrs. Harry W. Cox & Co., Ltd., 159, Great Portland Street, W.

Intramine.—Mr. J. E. R. McDonagh says that intramine is a strong reducing agent, and therefore should be used in conjunction with metallic

Fig. 123.

compounds, which act as oxidizing agents in syphilis as well as in all chronic bacterial diseases. The employment of intramine increases the benefit

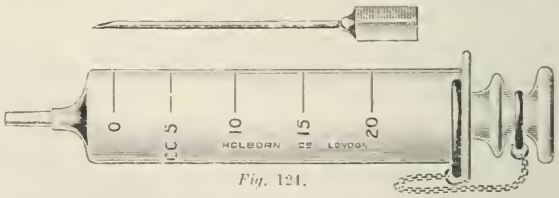


Fig. 124.

which results from treatment, diminishes the dose and number of the metallic injections necessary, and prevents toxic symptoms.

Intramine is supplied by The Holborn Surgical Instrument Co. Ltd., in 5-c c. ampoules, 2½ c c. injected into the buttock being the usual adult dose.

Fig. 124 illustrates a special needle and 20 c.c. all-glass syringe for injecting intramine and other oily fluids.

Irrigators.—We illustrate (*Fig.* 125) Carrel's apparatus for the sterilization of septic wounds with hypochlorite solution, as described by Dr. William O'Neill Sherman, of Pittsburg. The perforated tubes are placed in the deepest part of the wound (the number of tubes employed varying from one to four according to the size of the wound), which is then filled with the hypochlorite solution every two hours. The tubes, covered with towelling, are employed for open wounds, whose surfaces are thus kept in contact with the solution. Messrs. Allen & Hanburys Ltd., Wigmore St., and also the Holborn Surgical Instrument Co. Ltd., supply the apparatus.

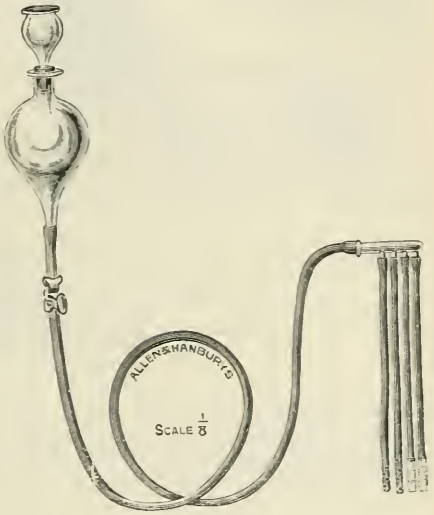


Fig. 125.

We also illustrate here (*Fig.* 126), an irrigator now used in the military hospitals for the treatment of gonorrhœa. It consists of an enamelled iron pail, which can be raised or lowered by means of pulleys. The fittings consist of 6 feet of rubber tubing, a bridge to prevent it kinking, a hook to secure it when not in use, a pinch clip, and a Janet glass nozzle. The antiseptic fluid is siphoned and the pressure obtained by gravitation. The complete apparatus or separate parts can be obtained from the Holborn Surgical Instrument Co. Ltd., who also supply a cheap and useful waterproof patient's apron (*Fig.* 127), which

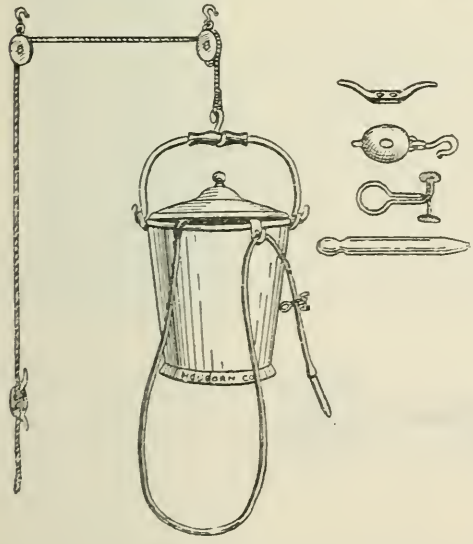


Fig. 126.

Fig. 127.

forms a protection for the patient's clothes, and is especially useful when permanganate of potash is used for irrigating.

Mouth Prop.—*Fig.* 128 shows a modification of Hewitt's chloroform mouth prop and tube suggested by Drs. A. de Winter Baker and H. L. Noel-Cox, in which rubber pads are substituted for the usual lead facings. These pads slide into grooves and can be renewed from time to time. The Holborn Surgical Instrument Co. Ltd. are the makers.

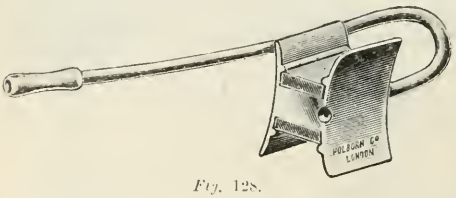


Fig. 128.

Needle-holder for Making Intravenous Injections.—*Fig.* 129 shows a combined needle-holder with two-way tap which has been devised by Dr. Spence for intravenous injections in the treatment of syphilis. The instrument can be manipulated with one hand, and the operator has

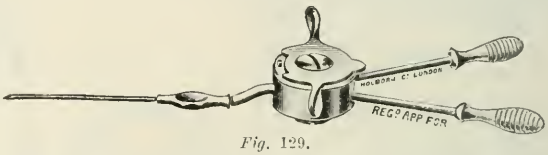


Fig. 129.

control over the flow of the fluid in both containers. The saline solution or the antisyphilitic fluid can be instantly turned on or off at will. This simple contrivance does away with the taps or clips which are usually fixed to the tubing and which require the services of an assistant. The nozzle

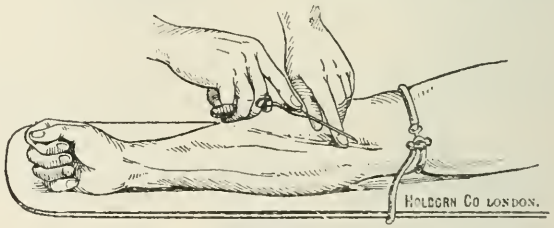


Fig. 130.

of the needle-holder has a slight crank bend which brings the needle into the plane of the under surface and in line with the vein. The most convenient, safest, and quickest way of introducing the needle into the vein is shown in *Fig.* 130. The Holborn Surgical Instrument Co. Ltd.

Otoscope.—This instrument, adapted to a binaural stethoscope, enables the aurist to hear with both ears instead of one. It is designed by Dr. Noel Adler and made by Messrs. Allen & Hanburys Ltd.

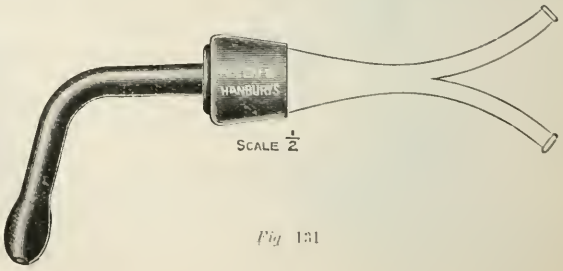


Fig 131

Saline Infusion Apparatus.—At the suggestion of Captain S. Gurney-Dixon, R.A.M.C., the Holborn Surgical Instrument Co. Ltd. have made a portable tin box to contain a continuous saline apparatus, with vacuum flask and a rod with clamp for attaching it to an army stretcher (*Fig.* 132). By means of this apparatus, saline can be given immediately in severely wounded cases during the delay which sometimes occurs in getting the wounded to the hospital. Captain Gurney-Dixon calls attention to the great advantages this apparatus possesses for use in the field.

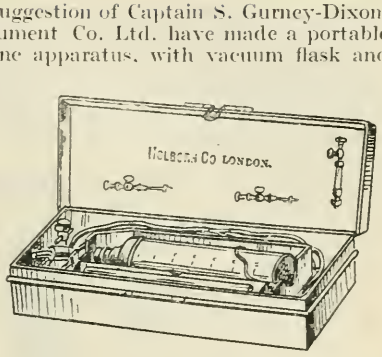


Fig. 132.

Surgical Basins.—These are made of unbreakable fibre-ware, and will be a great boon in hospitals, where many glass articles have to be washed. They will stand hot water, but not acids. They are very light and noiseless in use, an important point where much washing up has to be done in the wards. They are made up to 19 in. in diameter, the larger sizes being oval. The 10 in. and 12 in. sizes are very useful for many purposes. Patent Pulp Manufacturing Co., 38, York Road, King's Cross, London, N.

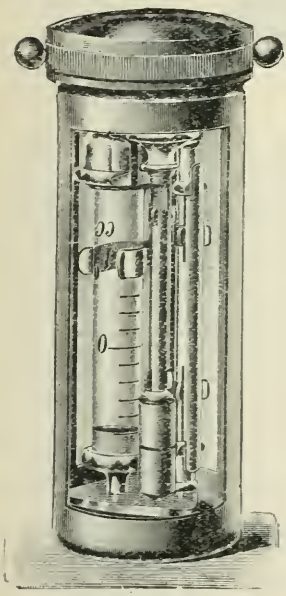


Fig. 133.

Syringes, Hypodermic.—We are glad to hear from Messrs. Braid & Co., 30, Gower Place, W.C., that they can again supply the 'Record' syringe. It has proved its reliability in every particular for so long, that the difficulty in obtaining it was serious to those who needed a syringe that would not fail them in emergency. It can also be obtained in a glass and metal receptacle (*Fig.* 133), so that the syringe and all its parts can be kept in absolute alcohol or brytstele. We have had one of these syringes immersed in brytstele for four years. It is to-day as bright as when it came from the makers. This is also supplied by Messrs. Braid & Co. When this solution is used as a preservative, it is necessary to wash the syringe well in hot water before use. It has an advantage over alcohol in the fact that it does not evaporate.

'Record' serum syringes can also be supplied.

The Holborn Surgical Instrument Co. Ltd. also make an all-glass syringe as illustrated in *Fig.* 134. Its special features are that it is fitted with finger bars, and thus can be more easily manipulated with one hand. It is graduated with a double scale, 1½ c.c. and 25 min. An elongating tube is supplied, which is an advantage when using the syringe through a speculum, as in the treatment of piles, etc. We have tested this syringe and find it most efficient.

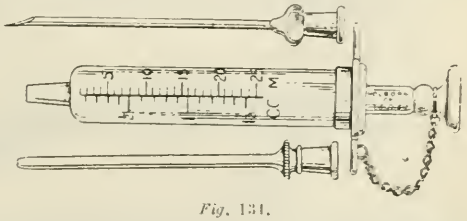


Fig. 134.

Spray for Paraffin.—The treatment of burns by spraying or painting them with heated wax preparations of paraffin with resorcin or beta-naphthol, etc., has been revived, and very satisfactory results obtained from it in the present war by Dr. Barthe de Sandfort, Lieut.-Colonel Hull, and others. The preparation seems to act as a splint, immobilizing the injured surface and shielding it while new tissue is formed. The method has been of great value in treating injuries produced by liquid-fire attacks, and also for cases of 'trench feet.'

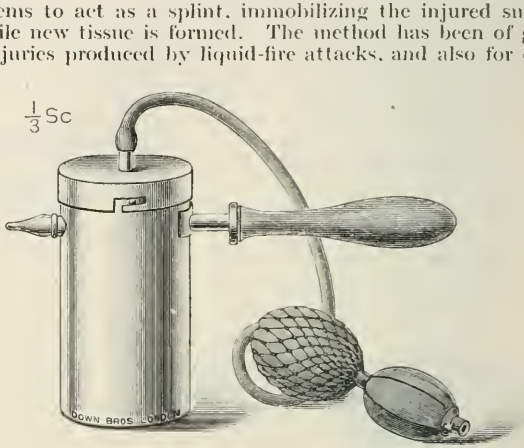


Fig. 135.

The chief feature of this spray (which also serves as a melting-pot for the wax) is the nozzle. This is adjustable, and can be fixed in any position on its mount. The spray is thus equally efficient in use with preparations of varying specific gravity, and a fine or coarse spray can be produced at will. The sprays, which we illustrate in *Fig.* 135, are made by Messrs. Down Bros. Ltd., St. Thomas's Street, London, S.E.

Stethoscopes.—*The Bock and Oertel Stethoscopes.*—The introduction of the Bock and Oertel differential stethoscopes marks a great advance in the auscultatory examination of the heart and other organs of the body. The relative intensity of the heart-sound at the apex to the second sound at

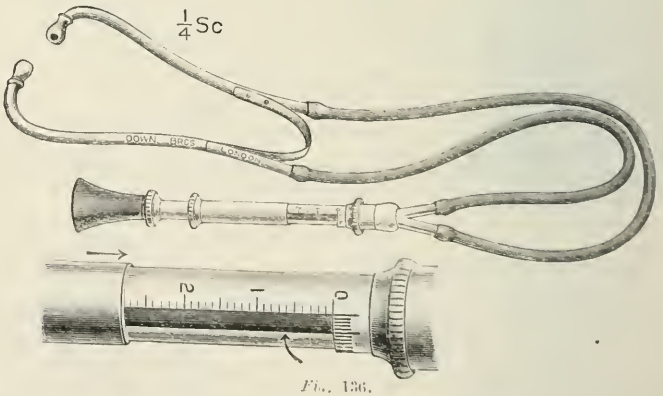


Fig. 136.

the base has been found by many observers (with the Bock stethoscope) to be as two to one. Any deviations from or an actual reversal of this ratio (a grave sign of myocardial degeneration) are at once perceived and measured

by these instruments. They can accurately measure the relative intensities of the heart-sounds even when the heart is beating vigorously, because the Oertel stethoscope will both allow sound to escape and admit sufficient external sound to overcome that made by the heart, while with the Bock stethoscope, constructed on a different principle, the heart-sound can be admitted and then excluded by gradually closing an opening in a sound-insulating diaphragm.

With the most perfect stethoscope for simply conducting sound, there is no means of actually gauging its intensity or comparing the relative values of the sounds heard, symptoms which the differential stethoscope would detect at once, as while these drawbacks diminish the sounds, they do not alter their ratios.

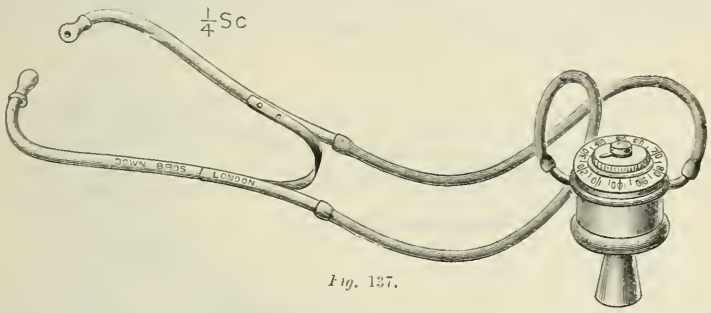


Fig. 137.

The Oertel stethoscope (*Fig.* 136) consists of a chest-piece to which a metal tube is attached; in the tube is an opening which can be widened or lengthened to any extent required, and the size of the opening measured by means of graduations on the instrument. The chest-piece is applied first to the apex, and the window opened in both directions until the first sound becomes inaudible; this exact point is noted. The chest-piece is then transferred to the aortic side, proceeding in the same way with the second sound.

The Bock stethoscope (*Fig.* 137) consists of a conical chest-piece attached to a circular box, divided into two compartments by a thick metal sound-insulating diaphragm, which is pierced by a small hole. This hole can be gradually closed by a metal cone which screws down into it. By means of a pointer travelling round a scale in the upper surface of the box, the points at which the varying aperture is opened or closed and the variations made in the size of the opening during manipulation can be observed.

The Oertel stethoscope can only be used in an absolutely quiet room, or in one with a 'constant' noise. The Bock instrument is the more useful of the two amid the noisy surroundings met with in hospital and general practice.]

The stethoscopes are made by Messrs. Down Bros. Ltd., St. Thomas's Street, London, S.E.

Messrs. Allen & Hanburys Ltd. also supply a 'Bock' differential Stethoscope, with some alterations and improvements by Dr. O. Leyton.

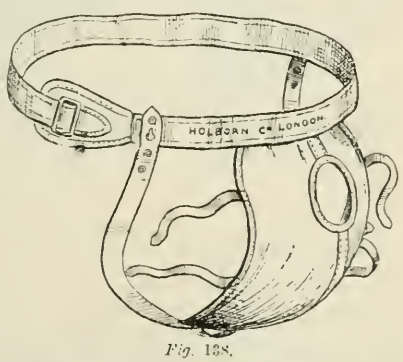


Fig. 138.

Suspensory Bandage.—The 'Jullien' Bandage (*Fig.* 138), suggested by a well-known French specialist of this name, is a great improvement on the

ordinary suspensory bandage, and has been adopted by the staff of the London Lock Hospital. The material is waterproof, and can therefore be kept clean. It can be adjusted by means of the straps, and made to hold the testicles securely and comfortably. Where hot fomentations are required, it is specially useful in retaining the heat. Price 4/6. The Holborn Surgical Instrument Co. Ltd.

Telephone Probe and Forceps.—This electric unit with probe and forceps, suggested by Dr. Edward H. Shenton, the senior surgical radiographer to Guy's Hospital, is so arranged that when the probe meets a metallic foreign body the operator obtains either a clearly audible buzz or, if working in the dark, the glow of a small lamp, and the signal is continuous while the probe remains in contact with the foreign body. The ordinary telephone bullet probe only gives an audible warning of the presence of a metallic object at the instant of making or breaking contact with it. The electric

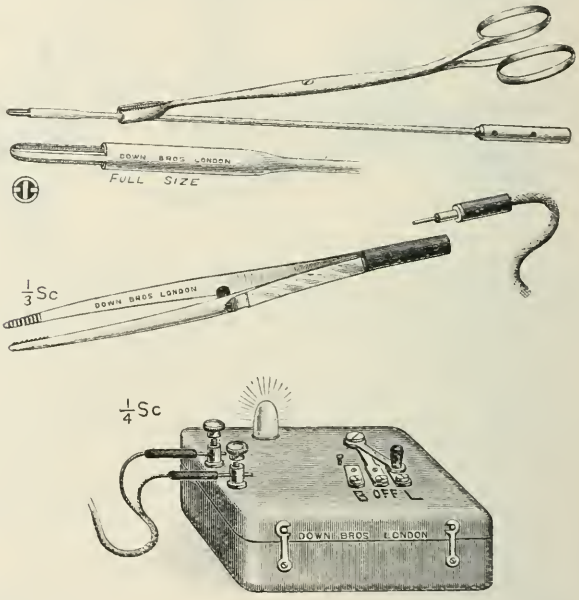


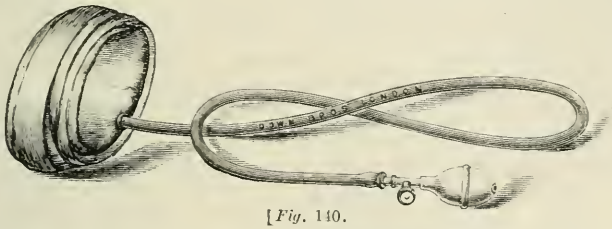
Fig. 139

spring forceps provided with this apparatus is believed by the author to be especially useful in all situations accessible to forceps, inasmuch as it acts as probe and forceps combined. When both blades are in contact with the foreign body the signal is given, and as long as the object is successfully grasped it is continuous. A special pair of bullet forceps has also been devised that can be passed down the probe, using it as a guide, and will grasp any foreign body with which the probe is in contact (*Fig.* 139).

Messrs. Down Bros. Ltd., St. Thomas's Street, London, S.E.

Tongue Depressor.—Messrs. A. E. Braid & Co. send us a glass tongue depressor. It is an improvement on previous efforts in the same direction, because the grooves to prevent it slipping are cut in the glass instead of being moulded. For hospital, dispensary, or consulting room work it has the great advantage that it can be more rapidly sterilized than any other instrument, while for diagnostic purposes it is quite efficient.

Tourniquet, Pneumatic.—Considerable attention has recently been drawn to the advantages of pneumatic tourniquets, of which there are now several varieties in existence, as, for instance, the one devised by Major R. H. Jocelyn Swan. *Fig.* 140 shows one made some time back for Dr. J. V. Fiddian by Messrs. Down Bros., Ltd., of St. Thomas's Street, London. It is on the same principle as the Verdon armlet supplied with Dr. French's



[*Fig.* 140.

sphygmomanometer. It is large enough to encircle any limb, and the cover, which is sterilizable, is simply adjusted by tucking in the end. The inflating bellows has a long tube, which is especially useful when it is necessary to provide against recurrence of bleeding, as the inflator can be left in a handy position in the bed, in readiness for immediate use by the nurse should this contingency arise.

Urethral Instruments. (*See also* IRRIGATORS.)—*Vacuum Bougie for the Treatment of Chronic Gonorrhœa.*—This apparatus (*Fig.* 141) has been designed by Captain A. Cambell for treating the chronic stage of gonorrhœa, when the gonococci are no longer accessible to injections or other local applications owing to 'sealing up' of the germs and the altered vascularity of the mucosa resulting from infiltration of the sub-epithelial tissue ; as Captain Cambell

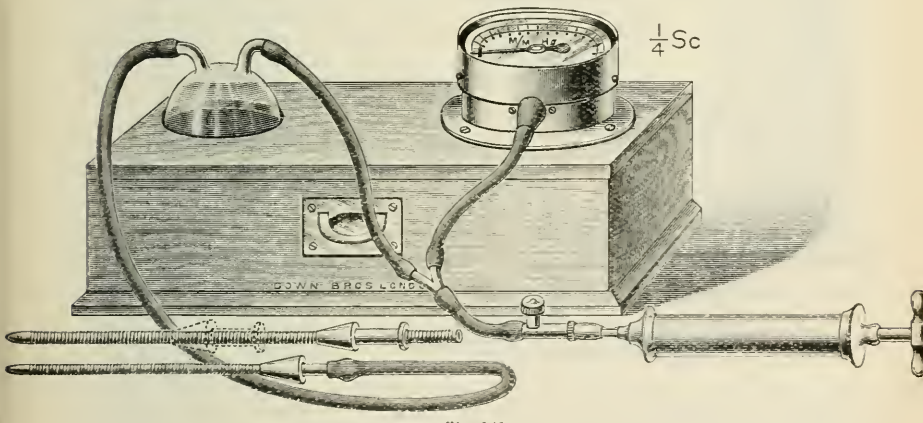


Fig. 141.

points out, these conditions will not yield to mechanical dilatation, and the application of heated bougies fails, as the requisite degree of heat cannot be tolerated.

The vacuum bougie consists of a spiral wire tube, wound so that the coils are in close contact, terminating in a hollow tip. This bougie can be bent to a complete circle, and will easily resume its original straight direction. Its total length is ten inches. A metal sheath about two inches long,

enlarged at one end into a cone, fits accurately over the bougie and can be slipped along it, leaving exposed whatever length may be necessary. An exhausting syringe fitted with a screw valve in connection with a manometer is joined up to the sheath cone and bougie by india-rubber tubing, a two-necked glass junction being interposed between the cone and the syringe to intercept any fragments, anæsthetic, etc., that may escape from the urethra when the bougie is *in situ*.

The patient lies on a couch, and the urethra is anæsthetized if necessary. The bougie, lubricated with carbolized vaseline, is passed on a No. 1 sound as a stylet. The sound is then withdrawn, and the sheath cone attached to the rest of the apparatus is slipped on to the bougie as far as the meatus. A few strokes of the pump will lower the atmospheric pressure in the urethra and suck the cone well into the meatus. The required suction-pressure is reached by further use of the pump. If all the joints are air-tight, the pressure will only rise about 5 to 10 mm. in fifteen minutes.

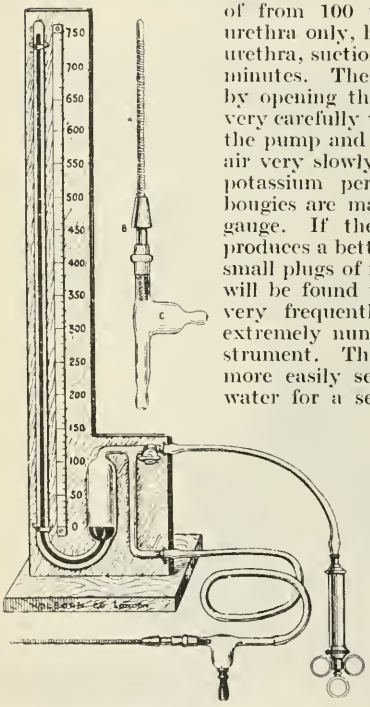


Fig. 142.

Dr. Cambell has obtained the best results with a height of from 100 to 200 mm. of mercury for the anterior urethra only, but with 300 to 500 mm. for the posterior urethra, suction being maintained from fifteen to twenty minutes. The pressure in the urethra is raised to normal by opening the screw valve: the bougie is withdrawn very carefully with one or two twists, after disconnecting the pump and taking off the sheath cone, and admitting air very slowly. The patient then irrigates with 1-8000 potassium permanganate or 1-4000 protargol. The bougies are made in two sizes—Nos. 9 and 12 English gauge. If the urethra will admit it, the larger size produces a better result than the smaller. After removal, small plugs of material may be seen on the bougie, which will be found to consist of pus and epithelial cells, and very frequently gonococci. In some cases they are extremely numerous along the whole length of the instrument. They are caught between the turns, and are more easily seen if the bougie is plunged into boiling water for a second. Dr. Cambell regard them as a sign of successful action. It is essential that the bougie be kept scrupulously clean. Boiling is not sufficient; it must be soaked in petrol or syringed out, and a linen thread must be run between the turns. The apparatus is made by Messrs. Down Bros. Ltd., St. Thomas's Street, London, S.E.

The Holborn Surgical Instrument Co. also send us particulars of another *Suction or Vacuum Apparatus* (*Fig.* 142), with special bougie for the treatment of gonorrhœa, by Captain A. Cambell. It consists of a manometer, which when at rest registers ordinary atmospheric pressure like a barometer, two spiral wire bougies (A) Nos. 9 and 12 English catheter gauge, with a cone (B) to plug the meatus, a glass piece (C) to catch urine, etc., and at suction pump. The inventor has obtained the best results with a height of about 100 to 200 mm. in anterior, and 300 to 400 in posterior cases.

A useful *Urethral Irrigator* is shown in *Fig.* 143. It consists of a nickel-plated frame with arm to carry vessel and to raise and lower, fitted to a polished mahogany board to screw to wall; half-gallon glass reservoir, with 8 ft. red rubber tubing and Valentine's handle, with push stop-cock.

The apparatus is also fitted with a nickel-plated frame to hold tray. The Holborn Surgical Instrument Co. Ltd., are the makers, and the same firm also supply, in various sizes, a useful *Glass Urethral Syringe* with a Janet-shaped nozzle and rubber plunger (*Fig.* 144).

At the suggestion of Capt. A. Cambell, the Holborn Surgical Instrument Co. also make plated metal Janet urethral nozzles (*Fig.* 145). They are

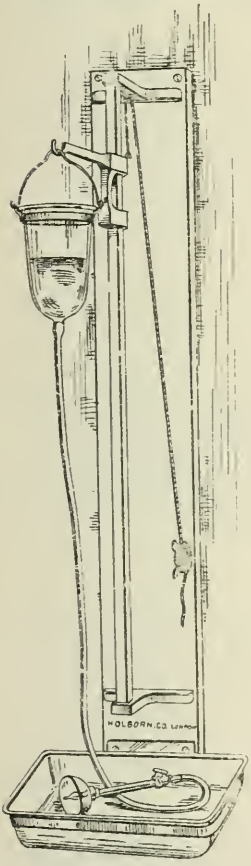


Fig. 143.

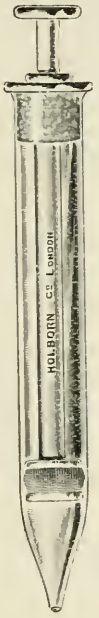


Fig 144

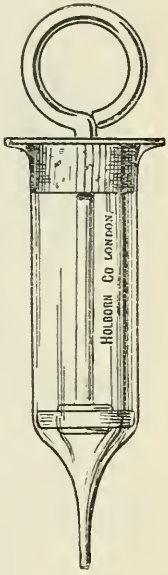


Fig 146.

Fig. 145.

practically everlasting, and in the long run considerably cheaper than the glass nozzles.

Urethral Syringe.—This is short and of wide diameter, so that it can be used by the patient with one hand. It holds over one ounce. It is designed by Mr. Walmesley and made by the Holborn Surgical Instrument Co. Ltd. (*Fig.* 146).

Urethra Dilator.—Canny Ryall's dilator is an improved form which does not require rubber covers, and which can be easily taken apart for cleaning.

It is made from steel which neither rusts nor tarnishes when brought into

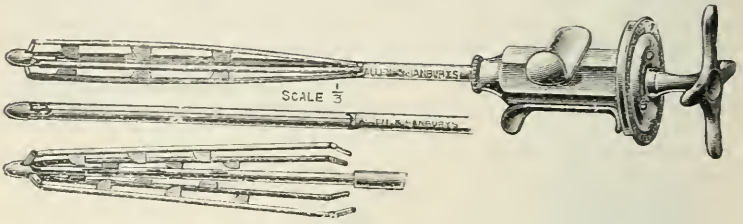


Fig. 147.

contact with antiseptic solutions (*Fig.* 147). Messrs. Allen & Hanburys Ltd., Wigmore Street, W.

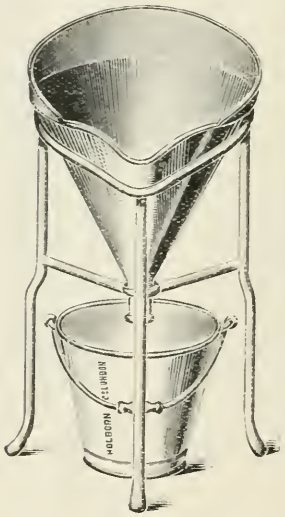


Fig. 148.

We show here (*Fig.* 148) a *Portable Sink* for urethral irrigation of male cases, made by the Holborn Surgical Instrument Co. Ltd., at the suggestion of Captain Hugh Wansey Bayly, the medical officer in charge of St. George's Hospital venereal department.

PROGRESS OF PHARMACY, DIETETICS, Etc.

Acetosal.—This form of acetylsalicylic acid has been put in the form of 'pulverettes' by Messrs. Oppenheimer Son & Co. Ltd., Queen Victoria Street. These may be crushed between the finger and thumb, and are more quickly soluble than compressed pellets. They are especially indicated when the rapid effect of the remedy is required.

Aldemint.—Under this name Messrs. Southall Bros. and Barclay, of Birmingham, produce an antiseptic lozenge containing formaldehyde in a very palatable form. The value of such a ready antiseptic for the mouth and throat is well known, and the preparation of the eminent Birmingham firm is as satisfactory a tablet as can be found.

Alopon.—This consists of the hydrochlorides of the mixture of alkaloids contained in opium. Its advantages over the crude drug, which it fully represents, are ready solubility and suitability for hypodermic injection.

A distinct use in therapeutics has been found for such a preparation. Special solutions for hypodermic use are prepared containing alopon alone, alopon with atropine, and alopon with scopolamine. The two latter combinations are useful for administration before surgical operations. Allen & Hanburys Ltd.

Anti-catarrh Vaccine (Prophylactic).—The St. Mary's Hospital vaccine laboratory (Director, Sir A. E. Wright), for whose preparations Messrs. Parke, Davis & Co. are the selling agents, has recently introduced a combined vaccine adapted for the preventive inoculation of individuals who suffer from recurring 'colds,' in cases in which a complete bacteriological investigation is not convenient, and where there is some general diminution in resistance, indicated by the patient becoming infected by any one of the several microbes which may cause these catarrhs, and of which those most frequently met with are employed in the constitution of the vaccine. It is not intended to replace an autogenous vaccine in the case of patients who are subject to the periodic lighting up of a chronic infection by some one microbe. The initial dose of this vaccine should be 0·5 c.c.; for the second dose 1 c.c. should be given fourteen days after the first, and repeated at monthly intervals during the winter. The injection may cause a considerable amount of local reaction. The vaccine is supplied in ampoules of 1 c.c., also in bottles of 25 c.c. Parke, Davis & Co., London.

Aquaperia.—We noticed favourably last year this British aperient water, which is put up by Camwal Ltd. in handsome quart bottles. The water is derived from their well-known spring on the Harrogate estate, and carefully standardized to secure uniformity of dosage. This makes an effectual substitute for the German and Hungarian waters, and may be taken with confidence.

Argein.—This is an improved form of colloidal silver proteinate, containing 8 per cent of silver. It is prepared in the form of scales, these dissolving more readily in water than similar proteinates in the form of powder. From the therapeutic point of view argein takes the place of protargol. Besides the scales, argein is prepared in the form of solution tablets, as 20 per cent solution in tubes for prophylactic use, and in pessaries and bougies. Allen & Hanburys Ltd.

Calobarb Tablets.—This new combination of well-tried aperient drugs has been found to possess advantages that entitle it to prominence. The family practitioner will find this association of calomel 1 gr. with phenolphthalein 2 gr., and powdered rhubarb 2 gr., exceedingly satisfactory in action and effect. Being in the form of a tablet, also, it seems to many patients less objectionable than a pill. The dose for an adult is one to two tablets; for children and delicate adults half or even a quarter of a tablet may be sufficient. A saline draught may be given next morning if so desired. Calobarb tablets are supplied in bottles of 100, 500, and 1000. Parke, Davis & Co.

Capsotherm.—An absorbent wool, saturated with capsicum, and possessing an impermeable back. It rigidly retains its original position and obviates the necessity of using oiled silk, gutta-percha, etc. It is made by Messrs. Oppenheimer, Son & Co. Ltd., who also manufacture a capsotherm glove impregnated with capsicum and wintergreen, and covered with impermeable silk.

Corpora Lutea Soluble Extract.—The administration of the yellow granular material contained in the ovaries of pregnant animals has given good results in the nervous disturbances following oophorectomy, also in those incidental to the climacteric, in the epileptic seizures accompanying menstruation, in amenorrhœa, dysmenorrhœa, menorrhagia, chlorosis, and hæmophilia. Corpora lutea has hitherto been supplied by Messrs. Parke, Davis & Co. in the powder form for oral administration, but that firm has now

introduced a liquid preparation for hypodermic administration in ampoules of 1 c.c., equivalent to 3 gr. of desiccated corpora lutea. This amount may be injected at first daily, then every second or third day, according to the indications. The ampoules are supplied in boxes of six.

Casein.—The firm of Casein Ltd. (Calvert Works, Battersea, S.W.) have succeeded in manufacturing a product which contains 100 per cent casein. In our last issue attention was called to the treatment of diabetes with a diet of cream and casein, which forms a very sustaining food. There are some who regard casein as a sufficient substitute for sanatogen, which contains 95 per cent of casein. It is very much cheaper, and the glycerophosphates may be added in medicinal form if necessary. The price of sanatogen and its substitutes has always been a factor in preventing its use among the poor. This product may help to get over the difficulty.

Cystoformin.—This is a compound of hexamine with sodium acetate, and represents about 40 per cent of the former. It is put up in tablets of 17 gr., and one of these is given three times a day when a urinary antiseptic is required. It also acts as a mild diuretic. It is a very unirritating and efficient remedy. Manufactured by Messrs. Southall Bros. & Barclay, of Birmingham.

Digalen and Omnopon.—We have called attention to these valuable preparations in our previous issues, and refer to them again because we were led to believe that the Hoffmann-la Roche Chemical Works Ltd., who are the manufacturers, were a German firm. We did this eminent Swiss firm a grave injustice. The firm was registered in Basle in 1894, and has no German or Austrian members, and its capital is entirely Swiss. We have made careful inquiry into this matter, as the circulars of rival imitators induced a conclusion which must have prejudiced a firm who have always maintained the high level of the Swiss chemists, to whom we owe many valuable productions. Digalen is now put up in tablets, and it would be difficult to find a heart tonic more reliable and so pleasant to administer. The firm also have ampoules, containing omnopon and scopolamine, which combine the therapeutic properties of the two drugs in a very efficient manner.

Digitalone is a physiologically standardized concentrated preparation in tablet form, containing the combined glucosides of digitalis leaves in their natural proportions. It is generally acknowledged that the administration (oral or hypodermic) of the separated principles, digitalin or digitoxin, does not produce the true digitalis effect, and the tincture is liable to cause digestive disturbance when administered over a long period, this effect being due, in part at least, to certain fatty principles which have been extracted from the leaves in its manufacture. It is believed that digitalone presents decided advantages over any single glucoside and over the tincture of digitalis. One grain possesses the therapeutic activity of $3\frac{1}{3}$ gr. of the leaves, 33 min. of tincture, or $\frac{1}{10}$ gr. of amorphous digitalin. Digitalone tablets for oral administration are supplied in two strengths, viz., $\frac{1}{10}$ gr. and $\frac{1}{5}$ gr. respectively, equivalent to $3\frac{1}{3}$ and $6\frac{1}{2}$ min. of the tincture. Digitalone hypodermic tablets are supplied in dosage of $\frac{1}{10}$ gr. and $\frac{1}{5}$ gr. respectively, equivalent to $\frac{1}{100}$ and $\frac{1}{20}$ gr. of amorphous digitalin. Parke, Davis & Co.

Diphtheria Toxin for the Schick Test.—The Schick test (*see* p. 165), which consists in the reaction produced by the intracutaneous injection of small amounts of diphtheria toxin, is of value as an indicator of susceptibility to diphtheria, as a diagnostic in obscure diphtheritic infection, and as a guide to serum dosage. The first-mentioned application proves very useful when the question arises whether prophylactic serum injections should be given to 'contacts.' The Schick test, which is easily carried out, will show whether the individual does or does not possess sufficient natural immunity to render serum unnecessary. If the typical reaction is not produced, the patient

is immune to the disease, serum need not be used, and thus the sensitizing of the patient need not be incurred. The toxin is sent out in tubes containing sufficient for ten tests, with a vial of physiological salt solution for diluting purposes, and full directions for use. Parke, Davis & Co.

Elixir Astringens.—This combination of astringent, carminative, antacid, and soothing remedies in an agreeably flavoured vehicle provides the physician with an excellent astringent for administration after the bowel has been cleansed from irritating or decomposing substances in all cases of acute or chronic diarrhœa, colic, etc. Being free from opiates, it is particularly suitable for use in the intestinal troubles of children. Each fluid drachm represents 5 gr. each of rhatany and blackberry root bark, 3 gr. of ginger, 2½ gr. of sodium bicarbonate, and ½ gr. of chloretone. The last-mentioned drug is useful in allaying colic and reducing peristalsis and tenesmus. The dose for adults is from 1 to 4 fluid dr., for children from 10 to 60 min. Supplied in bottles of 4, 8, 16, and 80 fluid oz. by Messrs. Parke, Davis & Co.

'Energen' Gluten Bread and Foods.—We have never regarded gluten bread as a practical diet in diabetes or glycosuria, not only because the patient most often refuses to eat it, but because the absolute exclusion of all starch is a danger in a large majority of cases. We must keep down the amount of starch consumed, but we must also find out, not how little, but how much, starch the patient can take without increase of symptoms. The Therapeutic Foods Co. have taken this question in hand on sound lines. Briefly, they have replaced a large quantity of carbohydrates by proteids and fat. They thus produce both bread, biscuits, and varieties of food which are not only palatable but have a high food value. This is important, because these products can be freely ordered in cases of dyspepsia when there is difficulty in the digestion of starch, for obesity, as well as in cases of diabetes and glycosuria.

The 'Energen protein food' contains proteids of milk, wheat, and nuts, with glycerophosphates. This is a unique preparation, because it gives us a farinaceous food with little starch. Energen gluten tapioca is also a very novel preparation, having more nutritive value than any other form of tapioca. There are a variety of biscuits, and the bread is put up in small dinner rolls or the long roll. Not only will these foods fill a want in our dietetic resources, but they represent a purely British industry. Previously most of our gluten has come from abroad. We have now a British product which is more efficient than any previously produced. The price is also reasonable: 60 small rolls, packed in boxes, cost 3 6. Messrs. R. Maurice & Co. Ltd., 21, 22, Bedford Chambers, Covent Garden, W.C.

Ferro-arsine.—The tonic hæmatinic properties of this preparation, which is a solution of iron peptonate, manganese, arsenic, and strychnine, render valuable service in anæmia, chlorosis, chronic skin diseases, general debility, etc. The metallic constituents are presented in intimate association with peptone, which, being most easy of assimilation, acts as a conveyor and facilitates the absorption of the inorganic principles. The administration of ferroarsine does not burden the digestion or constipate the bowels with an excessive dose of iron, but supplies an amount from which the system can derive benefit: as much indeed as can be required in any disordered condition. The dose for adults is from 1 to 2 teaspoonfuls thrice daily, with occasional intervals to avoid the cumulative effects of the arsenic. Ferro-arsine is supplied in bottles of 4, 8, 16, and 80 fluid oz. Parke, Davis & Co., London.

Grey-oil Ampoules.—These ampoules provide, in a convenient form, sterilized suspension of mercury adapted for intramuscular injection. Three dilutions are supplied, respectively containing 10, 20, and 40 per cent of the metal in an oleaginous base, with which is incorporated ¼ gr. of chloretone, the analgesic power of which greatly reduces, if it does not wholly prevent,

the occurrence of pain at the seat of injection. The ampoule should be slightly warmed till the contents become just pourable, and, after it has been well shaken, its two tips should be snapped off and the suspension poured into the barrel of a previously warmed glass syringe. As the ampoules contain 1½, 3, and 6 gr. of mercury respectively, they provide a useful range for selection according to the case to be treated. Any intermediate dose can be obtained by taking a proportion of the contents of the ampoule containing the next larger amount. Grey-oil ampoules are supplied in boxes of six or twelve of any one strength. Parke, Davis & Co., London.

Grindeline.—Under this name Messrs. Oppenheimer, Son & Co. Ltd. have put up a preparation valuable for asthma. It contains grindeline robusta, euphorbia, trinitrin, etc.

Hippurates.—It was the late Dr. Oliver who directed attention to the importance of the salts of hippuric acid in the treatment of arteriosclerosis. When we meet an elderly gouty patient with a rather high blood-pressure, the hippurate of ammonium, lithium, or sodium should at once suggest itself to us. In many cases it will give better results than iodide of potassium, and the action will be more continuous than that of the nitrites. Perhaps the lithia salt is best in such cases, in doses of 5 gr. twice daily. Of course, if the heart is dilated, it may be necessary to give strophanthus or strychnia, but digitalis is usually contra-indicated.

Formerly we had to rely on Germany for these salts, but they are now made available in any quantity by Messrs. Southall Bros. & Barclay, Birmingham.

Hypnogen (Diethyl-barbituric Acid).—This has been produced by Messrs. Oppenheimer, Son & Co. Ltd. as a substitute for veronal. It is a reliable hypnotic and sedative, and does not affect temperature or respiration, and is therefore valuable in cardiac cases. It is also stated to be a good antispasmodic, rapid in action, and very effective in sleeplessness. It is supplied in palatinoid form.

Iodex.—We have noticed this product of Messrs. Menley & James Ltd., 39, Farringdon Road, E.C., in previous issues. It is, however, worth while reminding our readers that it is a non-staining, non-irritating form of free iodine, for local antiseptic use. The manufacturers issue various preparations of it adapted for use in different parts of the body. For instance, there is an ointment for application to the skin, a pessary for vaginal use, a suppository, and a liquid colloidal preparation for use in aural and naso-pharyngeal work and the like. The pessaries are provided with a soluble gelatin envelope which, if warmed by dipping in hot water, provides its own lubricant.

Lecithin.—This has now been put up in the form of pulverettes, each containing 1 gr., by Messrs. Oppenheimer, Son & Co. Ltd. This ensures the speedy action of the remedy, and is convenient for taking with the meals, when indicated.

Lycresol.—This contains 50 per cent of free cresol and is soluble in water. Distilled water is necessary if a clear solution is required. A solution of 1–40 makes an efficient antiseptic for most purposes. Messrs. Southall Bros. & Barclay, Birmingham, are the manufacturers.

Lymphagogue Tablets.—Each of these tablets contains 5 gr. of sodium chloride and ½ gr. of sodium citrate. Four tablets added to 7 dr. of distilled water make a solution containing 5 per cent of the former and 0·5 per cent of the latter salt, suitable for use as a hypertonic dressing to promote osmosis and prevent coagulation of the lymph. The tablets may also be employed for continuous action on the lymph, if two or more are placed in the sterile gauze dressing or in the drainage tube. Lymphagogue tablets are supplied in bottles of 100 and 500. Parke, Davis & Co., London.

Metramine.—Under this name Messrs. Oppenheimer, Son & Co. Ltd. put up 5-gr. palatinoids of the bladder antiseptic better known as urotropin or hexamine. A very convenient and reliable preparation for the treatment of cystitis.

Mist. Quineti Conc.—Under this name Messrs. C. J. Hewlett & Son Ltd. put up a mixture of the cinchona alkaloids, suitably flavoured. Each drachm contains 1 gr. of quinetum and 1 gr. of cinchonine sulph. It makes an excellent tonic mixture.

Petrolatum, Liquid, Colourless.—The extensive use of liquid paraffin for constipation has led to the sale of a great deal which is not suitable for the purpose. Parke, Davis & Co. wish to point out that their liquid petrolatum is a pure, tasteless, odourless mineral oil of the correct viscosity. Oils that do not answer the last-mentioned requirement fail to lubricate the intestine satisfactorily, and are liable to ooze from the rectum. On the other hand, there are oils which are sufficiently viscous but are not free from sulphur and asphaltic compounds. Supplied in bottles of 4, 8, 16, and 80 fluid oz., and prescriptions for it can be dispensed by any pharmacist. Parke, Davis & Co., London.

Phylacogen, Mixed Infection (also rheumatism phylacogen, gonorrhœa phylacogen, pneumonia phylacogen, and erysipelas phylacogen).—Since the several phylacogens (aqueous solutions of bacterial derivatives) were introduced by Parke, Davis & Co., their use has very greatly developed and extended, and remarkable reports have been published by physicians well qualified to form an opinion as to their therapeutic value. As a result of increased observation of their action and effects, it has been found that satisfactory results may be obtained from smaller doses than those at first recommended by their originator, Dr. Schafer. Both local and systemic reactions are thereby greatly reduced and the treatment is rendered much more economical. For the convenience of physicians, therefore, Messrs. Parke, Davis & Co. have introduced smaller packages, viz., bulbs of 1 c.c., in boxes of five bulbs, for each of the above-mentioned phylacogens.

Robophos.—This is a British-made sanatogen, and consists of about 90 per cent casein and 15 per cent glycerophosphates. It is not a mechanical mixture, as are many of the imitations now upon the market, but a chemical combination. It contains a little cream, which furnishes a small proportion of fat, and although it gives to the preparation a faint cream colour it is considered a distinct improvement. It is made by Messrs. Oppenheimer, Son & Co. Ltd.

Sanagen.—This is practically identical with sanatogen. Analysis shows that it is slightly richer in phosphates and contains less moisture. It has been proved by experience to be a valuable nutritive agent in cases of debility and nervous exhaustion, and may be prescribed with every confidence. It is made by Casein Ltd., Culvert Works, Battersea, S.W.

Scopolamine (Hyoscine) Preparations.—The publicity given to 'twilight sleep' in obstetrics has led to a demand for new strengths and combinations of scopolamine preparations. Physiological experiment shows that there is no difference in the action of hyoscine and scopolamine (which are chemically identical) if the lævo-rotatory variety of the respective alkaloids is employed, but that the optically inactive variety should not be used. Messrs. Parke, Davis & Co. offer the hypodermic salt of the lævo-rotatory alkaloid in the following forms: hyoscine (scopolamine) hydrobromide, in hypodermic tablets of four strengths, also as a solution in 'glaseptic' ampoules (two strengths); hyoscine (scopolamine) and morphine hypodermic tablets in five different proportions, also as a solution in 'glaseptic' ampoules (one formula only).

Sedobrol.—This is used in cases where a salt-free diet is ordered. The patient has all the enjoyment of salt without taking any chloride. It is pre-

pared in small squares, and one or two of these are dissolved in hot water make a bouillon or gravy which can be added to any dish the patient is taking. Like all the products of this eminent Swiss firm, it is put up in that dainty manner which appeals to the user. Both the French and the Swiss pharmacists realize the importance of presenting an article nicely. The Hoffman-La Roche Chemical Co. Ltd., 7 and 8, Idol Lane, E.C.

Seroden is a colloidal combination of iodine with serum proteins. The advantages of this preparation over the alkali iodides are ease of assimilation and increase of activity for the proportion of iodine present. It is prepared in capsules, each containing 1 gr .of iodine in organo-colloidal combination. Seroden is especially valuable in rheumatoid arthritis and fibrositis ; it may also be employed in all the conditions for which the iodides are indicated. Allen & Hanburys Ltd.

Soaps (Medicated).—All dry skin eruptions are better treated by a medicated soap than with ointments, providing that we can be sure of the quality of the soap and that it contains the medicament in an active form. We can have no doubt on this point with the soaps made by Messrs. Chas. Midgley Ltd., 4, Exchange Street, Manchester. They have long specialized in this branch, and have a list of over one hundred formulæ which they prepare to meet all forms of skin disease. In many cases the full value of this form of medication is only secured by gently rubbing a lather of the soap over the surface, leaving it to dry for a few minutes, and then rubbing off with a soft cloth.

Sphagnol is a peat product which has attained considerable reputation in the treatment of eczema and various skin eruptions. It is a brown substance having something of the character of ichthyol : it has been used in the treatment of piles, and also at the 'Front' for cases of sores and excoriation of the feet. It is made up in the form of ointment, a cream, soap (15 per cent), and suppositories. Peat Products Co., 18 and 19, Queenhithe, Upper Thames Street, E.C., are the manufacturers.

Subitol.—This name is given to a perfect substitute for ichthyol, which is produced by Messrs. Zimmermann & Co., St. Mary-at-Hill, E.C. This appears to us an excellent preparation, and will meet the need of those who find it difficult to secure the original product.

Umbrose is a specially prepared barium meal for *x*-ray diagnosis. It contains 75 per cent of pure barium sulphate incorporated with a basis which, when boiled with water, forms a palatable and attractive 'meal.' As the opacity to *x* rays of barium sulphate is less than that of bismuth, the largest 'meal' gives the best results in adults. The advantages of umbrose are that it is very readily prepared, requiring only to be mixed with water in a suitable vessel and heated to boiling ; also that it presents a considerable economy compared with bismuth 'meals.' Allen & Hanburys Ltd.

Virophos.—This consists of casein, extract of malt, and sodium glycerophosphate. It is pleasantly flavoured, and makes an excellent tonic food in all conditions of debility and in wasting diseases. It is distinctly more palatable than many preparations of a like nature. It is sold at a moderate price by Messrs. C. J. Hewlett & Son, Ltd., the manufacturers.

Vitafer.—A preparation containing the entire protein constituents of milk, with the glycerophosphates of calcium, sodium, and magnesium. It is manufactured in the West of Ireland, and occurs as a finely granular powder, nearly white in colour, and with very little taste. It is claimed that the introduction of the magnesium element checks the tendency to constipation which concentrated foods frequently produce. It has been very largely used in exhausting diseases, with excellent results, and it can be recommended with confidence. Messrs. Southall Bros. & Barclay, Birmingham, are the manufacturers.

BOOKS OF THE YEAR.

A List of the Principal Medical Works and New Editions Published during 1916.

*** *For the convenience of our readers any of the works in this list can be obtained from Messrs. John Wright & Sons, Ltd., "Medical Annual" Offices, Bristol.*

AMBULANCE AND NURSING.

Bed Sores: Their Prevention and Cure. By Catherine W. Smart. 18mo, pp. 52. *Bale* - - - - - - *Limp Cloth, Net* 1*s.*

Clinical Notes for Probationers. By Félicie Norton. 32mo, pp. 136. *The Scientific Press* - - - - - - *Net* 1*s.* 3*d.*

Compendium of Aids to First-Aid. By N. Corbet Fletcher. With an Introduction by James Cantlie. 3rd ed. 18mo. *Bale* - *Net* 6*d.*

First Aid in Few Words. By J. M. Carvell 64mo. *Bale* *Cloth, 4d.; Sewed, 2d.*

Handbook for Attendants on the Insane. Published by the authority of the Medico-Psychological Association. 6th ed. (reprinted). Pp. 416. 20 Illus. - - - - - - - - *Net* 2*s.* 6*d.*

Home Nursing. By Edith Newsome. Comprising Lectures given to Detachments of the British Red Cross Society. Cr. 8vo, pp. 171. *Scientific Press* - - - - - - - - *Net* 2*s.* 6*d.*

Manual of Fire Prevention and Fire Protection for Hospitals. By Otto R. Eichel. Cr. 8vo. Cloth. *Chapman & Hall* *Net* 4*s.* 6*d.*

Manual for Nurses. By Sydney Welham. 2nd ed. Cr. 8vo, pp. 240. *Mills & Boone* - - - - - - - *Net* 1*s.* 6*d.*

Medical Homes for Private Patients. 1916. 16mo, pp. 167. *Aberdeen University Press* - - - - - - - *Net* 6*d.*

Mental Nursing. By W. H. B. Stoddart. Cr. 8vo, pp. 98. *Scientific Press* - - - - - - - - *Net* 2*s.* 6*d.*

Nursing Home, The. By Arthur Applin. Cheap ed. Cr. 8vo, pp. 308. *Mills & Boone* - - - - - - *Sewed, Net* 1*s.*

Practical Hints for V.A.D. By Mrs. H. de Vere Stacpoole. 18mo, pp 46. *Hutchinson* - - - - - - - - *Net.* 6*d.*

Practical Hints to Would-be Nurses. By Félicie Norton. 18mo, pp. 40. *Scientific Press* - - - - - - - *Net* 1*s.* 3*d.*

Questions and Answers on Home Nursing, for the St. John Ambulance Association and Others. By J. W. Martin and Leonard S. Barnes. 6th ed. Pp. 156. *Baillière* - - - - - - *Net* 1*s.* 6*d.*

Roller Bandage, The. By Howard M. Preston. The Application of the Roller Bandage shown by Illustrations and Text. With an Introduction by James Cantlie. 18mo, pp. 132. *Bale* - *Sewed, Net* 1*s.*

Surgical Gynæcological Nursing. By Edward Mason Parker and Scott Dudley Breckinridge. Demy 8vo. *Lippincott* - - *Net* 10*s.* 6*d.*

Surgical Nursing and Technique: A Book for Nurses, Dressers, House Surgeons, etc. By Charles P. Childe. Cr. 8vo, pp. 246. 9 Plates and 91 Illus. - - - - - - - *Net* 3*s.* 6*d.*

Text-Book for Nurses. By E. W. Hey Groves and J. M. Fortescue. Brickdale. 3rd Imp. Roy. 8vo, pp. 431. *H. Frowde and Hodder and Stoughton* - - - - - - - *Net* 16*s.*

Triangular Bandage, The. By Howard M. Preston. With an Introduction by James Cantlie. Fully Illustrated with 116 figures. 18mo, pp. 70. *Bale* - - - - - - - - *Sewed, Net* 1*s.*

ANATOMY AND PHYSIOLOGY.

Anatomy: Descriptive and Applied. By Henry Gray. Edited by Robert Howden. 19th ed. Roy. 8vo, pp. 1319. *Longmans* *Net* 32*s*.

Endocrine Organs, The. By Edward A. Schäfer. An Introduction to the Study of Internal Secretion. With numerous Illus. Roy. 8vo, pp. 166. *Longmans* - - - - - - - - *Net* 10*s*. 6*d*.

Essentials of Chemical Physiology. By W. D. Halliburton. 9th ed. Demy 8vo, pp. 335. *Longmans* - - - - *Net* 6*s*.

Internal Anatomy of the Face. By M. H. Cryer. 2nd ed., revised and enlarged. Cr. 4to, pp. 360. 377 Illus. *Kimpton* - *Net* 21*s*.

Manual of Anatomy: Systemic and Practical, including Embryology. By A. M. Buchanan. 3rd ed. Demy 8vo, pp. 1755. 675 Illus. *Net* 21*s*.

Manual of Physiology, with Practical Exercises. By G. N. Stewart. 7th ed. (reprinted). Demy 8vo, pp. 1156. Coloured Plate and 467 Illus, plain and coloured. *Baillière* - - - *Net* 18*s*.

Manual of Surgical Anatomy. By Lewis Beesly and T. B. Johnston. Cr. 8vo, pp. 572. *Frowde & Hodder & Stoughton* - *Net* 12*s*. 6*d*.

Newer Physiology in Surgical and General Practice. By A. Rendle Short. 3rd ed. Revised and partly rewritten. *J. Wright & Sons Ltd.* *Net* 5*s*.

Pocket Anatomy. Revised and Edited by C. H. Fagge 7th ed (reprinted). Pp. 312 - - - - - - - - *Net* 3*s*. 6*d*.

Popular Atlas of the Anatomy and Physiology of the Male Human Body. Composed of Superposed Coloured Plates showing Muscles, Skeleton, and Internal Organs. With explanatory text by Hubert E. J. Biss. Size 16½ by 8 in. 2nd ed. *Ballière* - - *Net* 3*s*. 6*d*.

Surgical Anatomy. By John A. C. Macewen. 2nd ed. 77 Illus. Demy 8vo. *Baillière* - - - - - *Cloth*, *Net* 10*s*. 6*d*.

Text-Book of Anatomy and Physiology. By Elizabeth R. Bundy. 4th ed., revised and enlarged. 243 Illus., 46 in colours. Demy 8vo. *Churchill* *Net* 8*s*. 6*d*.

BACTERIOLOGY.

Aids to Bacteriology. By C. G. Moor and William Partridge. 3rd ed. 18mo, pp. 286. *Baillière* - - - - - *Net* 3*s*. 6*d*.

Laboratory Manual in General Microbiology. Cr. 8vo. *Chapman & Hall* - - - - - - - *Net* 10*s*. 6*d*.

Practical Bacteriology, Blood Work, and Animal Parasitology: including Bacteriological Keys, Zoological Tables, and Explanatory Clinical Notes. By E. R. Stitt. 4th ed. 4 Plates and 115 other Illus. Post 8vo. *H. K. Lewis* - - - - *Net* 9*s*.

CANCER.

Notes on the Causation of Cancer. By Rollo Russell. With a Preface by Dawtrey Drewitt. Cr. 8vo, pp. 127. *Longmans* - *Net* 3*s*. 6*d*.

CHEMISTRY AND PHYSICS.

Analytical Chemistry. By F. P. Treadwell. Vol. I.—Quantitative Analysis. Translated by William T. Hall. 4th English ed. Demy 8vo. *Chapman* - - - - - - - - *Net* 12*s*. 6*d*.

Class-Book of Chemistry. By G. C. Donington. Part IV.—Metals. Cr. 8vo, pp. 133. *Macmillan* - - - - 2*s*.

Elementary Practical Chemistry. By Frank Clowes and J. Bernard Coleman. Part 2—Analytical Chemistry, Qualitative and Quantitative. 8th ed. Cr. 8vo, pp. 280. *Churchill* - - - *Net* 3*s*. 6*d*.

Handbook of Colloid Chemistry. By Wolfgang Ostwald. Translated by Martin H. Fischer. Roy. 8vo. 60 Illus. *Churchill* - *Net* 12*s*. 6*d*.

LABORATORY COURSE IN SERUM STUDY. By Hans Zinsser, J. G. Hopkins, and Reuben Ottenberg. Roy. 8vo. *Macmillan* - - *Net* 5*s*. 6*d*.

MANUAL OF PRACTICAL PHYSICS. By H. E. Hadley. Cr. 8vo, pp. 274. *Macmillan* - - - - - - - 3*s*.

PHYSIOLOGICAL CHEMISTRY. By Albert P. Mathews. A Text-Book and Manual for Students. Roy. 8vo, pp. 1048. 77 Illus. *Baillière* *Net* 21*s*.

PROBLEMS OF PHYSIOLOGICAL AND PATHOLOGICAL CHEMISTRY OF METABOLISM. By Otto von Furth. Authorized Translation by Allen J. Smith. Demy 8vo. *Lippincott* - - - - *Cloth*, *Net* 25*s*.

SYSTEM OF PHYSICAL CHEMISTRY. By William C. McC. Lewis. In 2 Vols. Cr. 8vo, pp. 535, 560. *Longmans* - - - *Net*, *each* 9*s*.

TEXT-BOOK OF PHYSICS AND CHEMISTRY FOR NURSES. By A. R. Bliss and A. H. Olive. Demy 8vo. *Lippincott* - - - *Net* 6*s*.

TEXT-BOOK OF PRACTICAL PHYSICS. By H. S. Allen and H. Moore. Cr. 8vo, pp. 638. *Macmillan* - - - - - *Net* 8*s*. 6*d*.

CHILDREN'S DISEASES AND INFANCY.

ABNORMAL CHILDREN (NERVOUS, MISCHIEVOUS, PRECOCIOUS, AND BACKWARD). By Bernard Hollander. A Book for Parents, Teachers, and Medical Officers of Schools. Illus. Cr. 8vo. pp. 236. *K. Paul* *Net*, 3*s*. 6*d*.

CARE OF CHILDREN FROM BABYHOOD TO ADOLESCENCE. By Bernard Myers. For Mothers and Nurses. 3rd ed., revised and enlarged. Cr. 8vo. pp. 184. *Kimpton* - *Cloth*, *Net* 2*s*. 6*d*.; *Sewed*, *Net* 1*s*. 6*d*.

CARE AND FEEDING OF CHILDREN. By L. Emmett Holt. A Catechism for the Use of Mothers and Children's Nurses. With an Introduction by Eric Pritchard. 7th ed., revised and enlarged. Cr. 8vo, pp. 154. *Appleton*. *Net* 2*s*.

CARE AND FEEDING OF INFANTS AND CHILDREN. By Walter R. Ramsey. Including Suggestions on Nursing. By Margaret B. Lettice and N. G. Gossman. *Lippincott's Nursing Manuals*. Demy 8vo. *Lippincott* *Net* 9*s*.

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Fenstanton, Christchurch Road, Streatham Hill. Res. Med. Supt., J. H. Earls, M.D. Access—Tulse Hill, or Streatham Hill, 5 minutes.

Flower House, Catford, S.E. Res. Med. Supt., Dr. C. C. Bullmore. Access — C. & D.R., Beckenham Hill, 5 minutes.

Halliford House, Sunbury-on-Thames, S.W. Res. Med. Supt., W. J. H. Haslett, M.R.C.S. Access—Sunbury station, 1¼ miles.

Hayes Park (for ladies), Hayes, Middlesex. Res. Med. Off., Dr. H. F. Stilwell. Access—Hayes, 2 miles.

Hendon Grove Asylum (for ladies), Hendon. Med. Lic., H. L. de Caux, L.M.S.S.A., L.S.A. (Lond.). Access—By M.R., Hendon station, ½ mile, or 'bus from Tube at Golder's Green. *See also p.* 738

London County Asylum, Banstead Downs, near Sutton, Surrey. Res. Med. Supt., Dr. P. C. Spark. Access—Belmont station, ½ mile; Sutton station, 1½ miles.

London County Asylum, Bexley, Kent. Res. Med. Supt., T. E. K. Stansfield, M.B. Access—Bexley station. 1¼ miles,

London County Asylum, Cane Hill, Coulsdon, Surrey. Acting Res. Med. Supt., Dr. E. S. Littlejohn. Access—Coulsdon, S.E.R., or Coulsdon and Smitham Downs, L.B. & S.C.R., 10 minutes.

London County Asylum, Claybury, Woodford Bridge, Essex. Acting Med. Supt., Chas. Theodore Ewart, M.D. Access—Woodford Bridge station, G.E.R., 1½ miles.

London County Asylum, Colney Hatch, N. Res. Med. Supt., S. J. Gilfillan, M.A., M.B. Access—New Southgate, G.N.R.

London County Asylum, Hanwell. Res. Med. Supt., Dr. P. J. Baily.

London County Asylum, Horton, Epsom. Res. Med. Supt., Dr. J. R. Lord. Access—L. & S.W. Ry., 1½ miles, L.B. & S.C.R., 1¾ miles. (*Temporarily in use as a War Hospital.*)

London County Asylum, Long Grove, Epsom. Res. Med. Supt., D. Ogilvy, M.D. Access—L. & S.W.R. and L.B. & S.C.R.

London County Asylum, The Manor, Epsom. Res. Med. Supt., W. Ireland Donaldson, M.D. Access—L. & S.W. and L.B. & S.C.R.

London County Colony (for Insane Epileptics), Epsom. Res. Med. Supt., Dr. M. A. Collins. Access—L. & S.W. & L.B. & S.C.R. stations, 1½ miles.

Middlesex County Asylum, Tooting, S.W. Med. Supt., R. Worth, M.B., B.S. Access—Wandsworth Common station, 1 mile.

Moorcroft House, Hillingdon, Uxbridge, 2 miles. Med. Licensees, Dr. J. F. Stilwell and Dr. R. J. Stilwell. Access—West Drayton station, 2 miles.

Newlands House, Tooting Bec Common, S.W. Prop. and Res. Phys., Dr. J. Noel Sergeant. Access—Balham station, 1 mile, and motor bus.

Northumberland House, Green Lanes, N. Res. Med. Supt., Bernard Hart, M.D. Access—Finsbury Park station, 1 mile. *See also p.* 746

Otto House, 47, North End Road, West Kensington (for ladies). Lic. Prop., A. H. Sutherland. Lady Supt., Miss Brodie. Access—West Kensington station, 1 mile; Barons Court station (Piccadilly Tube), 1 mile. *See also p.* 748

Peckham House, 112, Peckham Road, S.E. Props., A. H. & H. G. Stocker. Res. Med. Supt., Dr. F. R. King. Access—Peckham Rye stat., 10 min. walk. *See also p.* 745

St. Luke's Hospital, Old St., E.C. Res. Med. Supt., Wm. Rawes, M.D., F.R.C.S. Convenient to principal London stations.

The Priory, Roehampton, S.W., near Richmond Park. Res. Med. Supt., James Chambers, M.D. Access—Barnes station, 10 mins.

West Ham Boro' Asylum, Goodmayes, Ilford. Res. Med. Supt., Dr. L. F. Hanbury. Access—Goodmayes, ¾ mile.

Wood End House, Hayes (ladies). Uxbridge, 3 miles. Med. Lic., Dr. R. J. Stilwell. Access—Hayes station, 1 mile.

Londonderry.—*District Asylum*. Res. Med. Supt., Dr. Hetherington. Access—Londonderry, 1 mile.

Macclesfield.—*Parkside Asylum*, and "*Uplands*" for private patients. Res. Med. Supt., H. Dove Cormac, M.B., M.S. Access—Macclesfield, 1 mile.

Maidstone.—*Kent County Asylum*. Res. Med. Supt., H. Wolseley Lewis, M.D. Access—Maidstone, 1½ miles.

West Malling Place, Kent. Res. Med. Supt., Dr. G. H. Adam. Access—Malling station, 1 mile.

Market Lavington (Wilts).—*Fiddington House*. Res. Med. Supt., J. R. Benson, F.R.C.S. Access—Lavington, G.W.R., 1 mile; Devizes, 6 miles. *See also p.* 751

Maryborough (Queen's County).—*District Asylum*. Res. Med. Supt., Dr. P. Coffey. Access—Maryborough, ½ mile.

Melrose, N.B.—*Roxburgh, Berwick, and Selkirk District Asylum*. Res. Med. Supt., J. C. Johnstone, M.D. Access—Melrose, 1 mile.

Melton.—*St. Audry's Hospital for Mental Diseases*, near Woodbridge. Res. Med. Supt., J. R. Whitwell, M.B. Access—Melton station, 1¼ miles; Woodbridge station, 2¼ miles.

Merstham (Surrey).—*Surrey County Asylum*, Netherne. Med. Supt., Dr. P. C. Coombes. Access—Coulsdon station, 2 miles.

Middlesbro'.—*County Boro' Asylum*. Res. Med. Supt., Dr. J. W. Geddes. Access—Middlesbro', 2 miles.

Monaghan (Ireland).—*District Asylum*. Res. Med. Supt., Dr. T. P. Conlon. Access—Monaghan, ¼ mile.

Montrose, N.B.—*Montrose Royal Lunatic Asylum*. Med. Supt., C. J. Shaw, M.D. Access—Hillside, ¼ mile; Dubton, 1 mile.

Morpeth.—*Northumberland County Asylum*. Res. Med. Supt., Thos. W. McDowall, M.D. Access—Morpeth station, 1 mile, by 'bus.

Mullingar.—*District Asylum*. Res. Med. Supt., Dr. Laurence Gavin. Access—Mullingar station, 1 mile.

Newcastle-on-Tyne.—*City Asylum*. Gosforth. Res. Med. Supt., James T. Callcott, M.D. Access—Newcastle, 4 miles. (*Temporarily in use as a War Hospital.*)

Northampton.—*Berrywood Asylum*. Res. Med. Supt., W. Harding, M.D. Access—Castle station, 2½ miles; Midland station, 3 miles.

St. Andrew's Hospital, Northampton. Med. Supt., D. F. Rambaut, M.A., M.D. (T.C. Dub.) Access—Northampton station, 1 mile. *See also p.* 739

Norwich.—*Bethel Hospital for Mental Diseases.* Res. Med. Supt., S. J. Fielding, M.B. Cons. Phys., Saml. J. Barton, M.D. Access—Norwich (Thorpe) station, 1 mile.

See also p. 743

Heigham Hall, Norwich. Res. Med. Prop., J. G. Gordon-Munn, M.D. Access—Thorpe sta., 1½ mls.

Norfolk County Asylum, Thorpe, Norwich. Res. Med. Supt., D. G. Thomson, M.D. Access — Whitlingham, 1 mile ; Norwich, 2½ miles. (*Temporarily in use as a War Hospital.*)

Norwich City Asylum, Hellesdon, near Norwich. Res. Phys. and Supt., Dr. David Rice. Access—Hellesdon, 1 mile.

The Grove, Old Catton, near Norwich (for ladies). Res. Med. Supt., C. A. P. Osburne, F.R.C.S. Apply to the Misses McLintock.

Nottingham.—*City Asylum*, Mapperley Hill. Med. Supt., E. Powell, M.R.C.S.

Notts County Asylum. Res. Med. Supt., S. L. Jones, M.R.C.S. Access—Radcliffe-on-Trent, 2 miles.

The Coppice. Res. Med. Supt., David Hunter, M.B. (Camb.). Access—Midland station, 2½ miles ; Gt. Northern & Gt. Central station, 1½ miles. *See also p.* 740

Omagh.—*District Asylum.* Res. Med. Supt., Dr. John Patrick. Access—Omagh station, 2 miles.

Oxford.—*County Asylum*, Littlemore. Res.Med.Supt.,T. S. Good,M.R.C.S. Access—Littlemore station.

The Warneford, Oxford, 1½ miles. Res. Med. Supt., Alex. W. Neill, M.D. Access—Oxford station, 2¼ miles. *See also p.* 749

Paisley.—*Craw Road Asylum.* Res. Med. Off., Mary P. Hislop, M.B., Ch.B. Access—Paisley, 1 mile.

Paisley District Asylum, Riccartsbar. Med. Off., D. Fraser, M.D. Access—Paisley West, ¼ mile.

Renfrew District Asylum, Dykebar, Paisley. Res. Med. Supt., R. D. Hotchkis, M.D.

Perth. — *District Asylum*, Murthly. Res. Med. Supt., Lewis C. Bruce, M.D. Access—Murthly.

James Murray's Royal Asylum, Perth (for private patients only). Phys. Supt., R. Dods Brown, M.D., F.R.C.P. Ed. Access—Perth station, under 2 miles. *See also p.* 747

Plympton.—*Plympton House*, Plympton, South Devon. Res. Props., Dr. Alfred Turner and Dr. J. C. Nixon. Access—Plympton, 1 mile ; Marsh Mills, 2 miles ; Plymouth, 5 miles. *See also p.* 748

Portsmouth. — *Borough Mental Hospital.* Res. Med. Supt., H. Devine, M.D.(Lond.) Access—Fratton, 1½ miles. *See also p.* 747

Prestwich (near Manchester).—*County Asylum.* Res. Med. Supt., Dr. F. Perceval. Acc.—Prestwich, ¾ mile.

Rainhill (nr. Liverpool).—*County Asylum.* Res. Med. Supt., T. P. Cowen, M.D. Access—St. Helens, 2½ miles ; Rainhill, 1 mile.

Rotherham (Yorkshire).—*The Grange*, 5 miles from Sheffield (for ladies). Con. Phys., W. C. Clapham, M.D. Res. Phys., G. E. Mould, M.R.C.S., L.R.C.P. Access—Grange Lane station, G.C.R., ½ mile.

See also p. 749

St. Albans. — *Herts County Asylum*, Hill End. Med. Supt., A. N. Boycott, M.D. Access—Hill End station, G.N.R., 2 minutes.

Middlesex County Asylum, Napsbury, near St. Albans, Herts. Res. Med. Supt., L. W. Rolleston, M.B., B.S. (*Temporarily in use as a War Hospital.*)

St. Leonards-on-Sea. — *Ashbrook Hall*, Hollington (for ladies). Res. Lics., Mr. and Mrs. Charles Somerset. Med. Off., Dr. Wm. E. Peck. Access—Warrior Square stat., 2 miles.

Salisbury.—*Fisherton House Asylum.* Res. Med. Supt., Dr. R. T. Finch. Access—Salisbury stat., L. & S.W. and G.W., 5 minute.

Laverstock House, Salisbury. Acting Med. Supt., Oswald Vevers, M.R.C.S., F.R.C.P. Access—Salisbury, 1½ miles.

Sevenoaks (Kent). — *Riverhead House* (for ladies). Res. Med. Supt., Dr. Wm. H. C. Macartney. Access—Sevenoaks station, S.E.R., ¾ mile.

Shrewsbury.—*Shropshire County Asylum.* Res. Med. Supt., W. S. Hughes, M.B., B.S. Access—Shrewsbury station, 2½ miles.

Sleaford.— *Kesteven County Asylum.* Med. Supt., J. A. Ewan, M.A., M.D. Access—Rauceby, G.N.R., ¼ mile.

Sligo.—*District Asylum.* Res. Med. Supt., Dr. Joseph Petit. Access—Sligo station, 1½ miles.

Stafford.— *County Mental Hospital.* Res. Med. Supt., Dr. J. W. S. Christie. Access—Stafford, 1 mile.

Coton Hill Mental Hospital, Stafford. Res. Med. Supt., R. W. Hewson, L.R.C.S. & P. (Edin.). Access—Stafford, 1 mile.

Stirling. — *District Asylum*, Larbert. Med. Supt., Dr. R. B. Campbell. Access—Larbert, 1½ miles.

Stone (near Aylesbury).—*Bucks County Asylum.* Res. Med. Supt., H. Kerr, M.D. Access—Aylesbury station, 3¼ miles.

Talgarth.—*Brecon and Radnor Asylum.* Res. Med. Supt., R. Pugh, M.D.

Tamworth (Staffs.).—*The Moat House* (for ladies). Res. Licensees, Edward Hollins, M.A., and Mrs. S. A. Michaux. Access—Tamworth stat., ¾ mile. *See also p.* 742

Taunton. — *Somerset & Bath Asylum*, Cotford, near Taunton. Res. Med. Supt., Dr. H. T. S. Aveline. Access—Norton Fitzwarren stat., 2 miles.

Ticehurst (Sussex).—*Ticehurst House.* Res. Med. Supt., Dr. H. Hayes Newington. Access—Wadhurst, 4 miles, or Ticehurst Road, 3 miles.

Tonbridge. — *Redlands.* Res. Med. Supt., W. A. Harmer, L.S.A. Access—Tonbridge junc., 2½ miles.

Virginia Water. — *Holloway Sanatorium*, Hospital for the Insane. St. Ann's Heath. Res. Med. Supt., W. D. Moore, M.D. Asst. Med. Offs., T. E. Harper, L.R.C.P., G.W. Smith, M.B., Emma M. Johnstone, L.R.C.P. & S., and C. Rutherford, M.B. Access—Virginia Water station, 5 minutes. Seaside Branch, *St. Ann's*, Canford Cliffs, Bournemouth. Med. Off., C. E. C. Williams, M.D. *See also p.* 746

Wadsley (near Sheffield).—*South Yorkshire Asylum.* Res. Med. Supt., W. J. N. Vincent, M.D. Access—Wadsley Bridge, 1 mile; Sheffield, 4 miles.

Wakefield. — *West Riding Asylum.* Res. Med. Supt., J. Shaw Bolton, M.D. Access—Kirkgate and Westgate station, 1 mile.

Wallingford (Berks.).—*Berkshire Asylum.*—Res. Med. Supt., J. W. A. Murdoch, M.B. Access—Cholsey 1 mile.

Warlingham (Surrey).—*Croydon Mental Hospital.* Res. Med. Supt., E. S. Pasmore, M.D. Access — Upper Warlingham, 3¼ miles.

Warrington (Lancs.).—*Lancashire County Asylum*, Winwick. Res. Med. Supt., A. Simpson, M.D. Access—Warrington, 2½ miles. (*Temporarily in use as a War Hospital.*)

Waterford. — *District Asylum.* Res. Med. Supt., J. A. Oakshott, M.D. Access—G.S. & W.R., North station, 2 miles.

St. Patrick's Private Asylum, Belmont Park. Conducted by the Brothers of Charity. Med. Supt., W. R. Morris, M.B. Access—Waterford station, 1 mile.

Wells.—*Somerset and Bath Asylum*, Wells, Som. Res. Med. Supt., Dr. G. Stevens Pope. Access—Wells station, 1½ miles.

Whitchurch (Salop).—*St. Mary's House* (ladies only). Res. Med. Supt., C. H. Gwynn, M.D. Access—Whitchurch, 1 mile.

Whitefield (near Manchester). — *Overdale.* Res. Phys., P. G. Mould, M.R.C.S. Access—Prestwich and Whitefield station, 1½ miles.

Whittingham (near Preston).—*County Asylum.* Res. Med. Supt., Dr. J. F. Gemmel. Access—Whittingham station, 3 minutes.

Winchelsea (Sussex).—*Periteau*, near Hastings (for ladies). Physician, Harvey Baird, M.D. Access—Winchelsea station, 1 mile.

Woking.—*Surrey County Asylum*, Brookwood. Res. Med. Supt., J. A. Lowry, M.D. Access—Brookwood station, 1¼ miles.

Worcester.—*County & City Lunatic Asylum*, Powick. Res. Med. Supt., Dr. G. M. P. Braine-Hartnell. Access—Worcester station, 4 miles.

York.—*The Pleasaunce* (ladies only). Phys. Supt. and Res. Licensee, L. D. H. Baugh, M.B. Access—York, 1½ miles. *See also p.* 744

The Retreat, York. Res. Med. Supt., Bedford Pierce, M.D., F.R.C.P. (Lond.). Access—York station, 1½ miles. Also *Throxenby Hall*, a branch house, near Scarborough. *See also p.* 746

Bootham Park Registered Hospital, York. Res. Med. Supt., G. R. Jeffrey, M.D. Access—York stat., 1 mile. *See also p.* 751

North Riding of Yorkshire Asylum, Clifton. Res. Med. Supt., A. I. Eades. Access—York, 2 miles.

York City Asylum, Fulford, York. Res. Med. Supt., Dr. C. L Hopkins.

MENTAL DEFICIENCY ACT, 1913: CERTIFIED INSTITUTIONS AND HOUSES.

Class A.—Certified Institutions. *Class B.*—Institutions approved under Section 37. *Class C.*—Certified Houses. *Class D.*—Approved Homes.

BUCKINGHAMSHARE.

Winslow Union Workhouse, Winslow.—20 male, 20 female, adults. Feeble minded and imbecile. Managers, Winslow Board of Guardians. (*Class B.*)

CHESHIRE.

Sandlebridge, near Alderley Edge.—290 males and females, under 13. Managers, Incorporated Lancashire and Cheshire Society for the Permanent Care of the Feeble Minded. Secretary, Ed. M. Richards, 1, Brazennose Street, Manchester. (*Class A.*)

Hoole Home, 57, *Hoole Lane, Chester.*—18 males, 22 females. Managers, Chester Board of Guardians. (*Class B.*)

CORNWALL.

The Elizabeth-Barclay Home, Bodmin.—26 females. Matron, Miss E. Hunt; Hon. Sec., Miss E. M. S. Shaw. (*Class D.*)

CUMBERLAND.

Durran Hill House, Carlisle.—65 females. Feeble minded. Higher Grade. Managers, T. W. Hunter, T. Barnes, and R. Brisco. (*Class A.*)

DERBYSHIRE.

Hopewell Hall, Ockbrook.—50 males. Managers, The Nottingham and Notts Association for the Permanent Care of the Feeble Minded. (*Class A.*)

Whittington Hall, Whittington, near Chesterfield.—400 females. Managers, The Incorporation of National Institutions for Persons requiring Care and Control. (*Class A.*)

DEVON.

Western Counties Institution, Starcross.—350 males and females (trainable cases). Managers, The Committee. (*Class A.*)

DORSET.

Kingsgate and Frithstow, West Moors, Wimborne.—12 females. Manager, Miss Bertha James. (*Class D.*)

DURHAM.

Monkton Hall Home for Lads, Jarrow-on-Tyne.—48 males. Secretary, J. Stewart, 90, Pilgrim Street, Newcastle. (*Class A.*)

ESSEX.

Elloe House, Church Road, Leyton.—122 females. Feeble minded, over 16. Managers, The Sisters of the Sacred Hearts of Jesus and Mary, Church Road, Leyton. (*Class A.*)

New Lodge, Leon House, Homestead and St. Keverne, Billericay.—56 males, of the middle class. Managers, The Co-operative Sanatoria, Ltd., T. W. Edwards, Secretary. (*Class A.*) *See also p.* 723

Poor Law Institution, Tendring, Weeley.—26 males, 26 females. Managers, Guardians, Tendring Union. H. J. Burden, Superintendent. (*Class A.*)

Royal Eastern Counties Institution, Colchester.—360 males and females, all grades. Managers, The Board of Directors. Address communications, The Medical Superintendent. (*Class A.*)

Thurlby House Special School, Woodford Bridge.—43 males. Manager, T. W. Hunter. (*Class A.*)

Gay Bowers, West Hanningfield, Chelmsford.—7 males. Managers, P. and G. Chennells. (*Class D.*)

FLINTSHIRE.

Walmer School for the Blind and Blind Deaf, Rhyl.—13 males and females. Feeble minded. Managers, Mrs. and Miss Roberts. (*Class D.*)

GLOUCESTERSHIRE.

Hanham Hall, Hanham, near Bristol.—240 males. Managers, The Incorporation of National Institutions for Persons requiring Care and Control. (*Class A.*)

Poor Law Institution, Stapleton.—6 males, 6 females. Managers, Bristol Board of Guardians. Superintendent, L. W. Williams. (*Class A, B, C* and *D.*)

Royal Victoria Home, Horfield.—42 females. Managers, The Incorporation of National Institutions for Persons requiring Care and Control. (*Class A.*)

St. Mary's Home, Painswick, near Stroud.—26 females. High grade feeble minded. Managers, Miss Wemyss, Washwell House, Painswick; S. G. Jones, Steanbridge House, near Stroud. (*Class A.*)

Stoke Park Colony, Stapleton, Bristol.—750 patients of both sexes (not exceeding 650 females or 300 males. Managers, The Incorporation of National Institutions for Persons requiring Care and Control. (*Class A.*) *See also p.* 750

Stoke Park Colony, West Side, Stapleton.—178 males. Managers, The Incorporation of National Institutions for Persons requiring Care and Control. (*Class A.*)

Mary Carpenter Home, Causeway, Fishponds, Bristol.—23 patients. Feeble-minded girls and women from 16 upwards. Managers, Hon. Sec., Mrs. Gilmore Barnett, 11, Victoria Square, Clifton: Hon. Treas., Mrs. F. F. Tuckett, Frenchay, near Bristol. (*Class D.*)

Royal Fort Home, Bristol.—12 females, high grade mentally deficient. Managers, Ladies' Committee. Hon. Sec., Miss Savill, 7, Woodland Road. (*Class D.*)

HAMPSHIRE.

St. Mary's Home, Alton.—45 mentally and morally deficient females. Managers. The Wantage Community of Sisters. (*Class A.*)

Poor Law Institution, Parkhurst, Isle of Wight.—5 males, 5 females. Supt., J. Mackeown. (*Class B.*)

HERTS.

St. Elizabeth's Home for Epileptics.—136 males and females. Manager, Apply to T. W. Hunter, Archbishop's House, Westminster, S.W. (*Class A.*)

KENT.

Princess Christian's Farm Colony, Hildenborough.—Males and females. Managers, National Association for the Feeble Minded. Superintendent, Constance F. C. Phillpotts. (*Class A.*)

LANCASHIRE.

Allerton Priory, R.C. Special Industrial School, Woolton, Liverpool. 106 male and female educable children. Superintendent, Sister M. Prisca. (*Class A.*)

Brockhall, Whalley, near Blackburn.—208, females. Feeble minded, imbeciles, and moral imbeciles. Managers, Mental Deficiency Acts Committee, Lancashire Asylums Board, Preston. (*Class A.*)

'*Pontville*,' *R.C. Special School, Ormskirk*.—106 boys. Mentally Defective. Managers, Sisters of the Sacred Hearts of Jesus and Mary; Correspondent, Right Rev. Monsignor Canon Pinnington, 109, Great Mersey Street, Liverpool. (*Class A.*)

Royal Albert Institution, Lancaster.—483 males, 243 females. Managers, The Central Committee of the Royal Albert Institution, Lancaster. (*Class A.*) *See also p.* 750.

The Macalpine Rescue Home, 350, *Moss Lane, East Manchester* (temporary premises)—7 females. Managers, The Committee; Hon. Sec., Miss Macalpine. (*Class A.*)

Seafield House, Waterloo Road, Seaforth, near Liverpool.—176 males and females. Managers, Guardians of the West Derby Union, Liverpool. (*Class B.*)

York Villa, Cropton Road, Formby.—4 females under 16 (private cases). Manager, Miss Bowyer. Formby. (*Class C.*)

LEICESTERSHIRE.

'*Cross Corners*,' *Loughborough Road, Leicester*. 20 females. Feeble minded. Managers, Leicester Corporation Mental Deficieney Committee. (*Class A.*)

LONDON.

Clifton House, 127, *Uxbridge Road, Shepherd's Bush, W*.—40 females. Feeble minded and moral imbeciles. Managers, The Church Army, Bryanston Street, W. (*Class A.*)

39, *Downs Road*, 41, *Downs Road*, 46–48, *Pembury Road, N.E*.—80 females. *Managers*, Committee of Girls' Training Homes, Clapton. (*Class A.*)

Kensington Workhouse. 32 females. Managers, Guardians of the Poor of the Parish of St. Mary Abbots, Kensington. (*Class A.*)

Springfield Lodge, Grove Hill Road, Denmark Hill.—28 females. Managers, Salvation Army. (*Class A.*)

The Helping Hand Home, 16, *Cathcart Hill, N*.—30 females. High grade mentally deficients. Managers, Committee; Hon. Sec., Mrs. Geoffrey Russell, 39, Mecklenburgh Square, W.C. (*Class A.*)

Woolwich Workhouse, Plumstead, S.E.—25 males and females. Temporary. Sent by L.C.C. only. Managers, Board of Guardians of the Woolwich Union. (*Class B.*)

MIDDLESEX.

All Souls' Special School, Field Heath House, Hillingdon.—89 females. Educable and imbeciles. Manager, T. W. Hunter. (*Class A.*)

Bramley House, Clay Hill, Enfield.—40 females. Managers, Committee for the Care of the Mentally Defective, Middlesex County Council. (*Class A.*)

'*Crathorne*,' *Oak Lane, East Finchley, N*.—32, consisting of women with their infants. Managers, Northern Heights Branch of the National Association Feeble Minded; Hon. Sec., Mrs. Moss-Blundell. (*Class A.*)

'*Enfield House*,' *Chase Side, Enfield*.—40 males. Managers, Guardians of Edmonton Union. Superintendent, E. B. Willett. (*Class A.*)

Warkworth House, Isleworth.—38 boys. Managers, Middlesex County Council. Superintendent, A. Milsom. (*Class B.*)

'*Arniston*,' *The Grove, Isleworth*.—15 males under 14, females under 21. Managers, Misses J. M. and M. D. Isbister. (*Class C.*)

'*Normansfield*,' *Hampton Wick*. 120 males and females. Manager, Dr. Langdon-Down. (*Class C.*)
See also p. 748

'*The Gables*,' *Upper Teddington Road, Hampton Wick*.—18 male and female children. Manager, Miss Frances M. Deek. (*Class C.*)

Alexander House, 117, *High Street, Uxbridge*.—Female. Managers, Committee. Hon. Secretary, Mrs. Western. *Class D.*

'*Conifers*,' *Hampton Wick*.—10 females. Manager, Dr. Langdon-Down. (*Class D.*)

'*Trematon*,' *Hampton Wick*. 12 males. Manager, Dr. Langdon-Down. (*Class D.*)

NORFOLK.

The Lodge, Bowthorpe Road, Norwich.—20 females. Managers, The Guardians of the Poor of the Norwich Incorporation. (*Class A.*)

Reedham Old Hall, Reedham.—30 females, children and girls. Superintendent and Proprietress, Miss S. A. Huntly. (*Class D.*)

NORTHUMBERLAND.

Prudhoe Hall Colony.—185, all classes. Managers, Northern Counties Joint Poor Law Committee. Clerk, J. W. Coulson, Poor Law Offices, South Shields. (*Class B.*)

Home of Industry, Bon Villa, Morpeth.—16 females. Feeble minded. Superintendent, Miss A. Pawsey. (*Class D.*)

OXFORDSHIRE.

(1) *Cumnor Rise, Oxford* (2) 19, *New Inn Hall Street, Oxford.*—46 females. High-grade feeble-minded. Managers, Committee. Hon. Secretary, Honble P. Bruce. (*Class A.*)

SOMERSET.

Clevedon Hall, Clevedon.—58 females. Managers, The Incorporation of National Institutions for Persons requiring Care and Control. (*Class A.*)

Leigh Court, Abbot's Leigh, near Bristol.—240 females. Managers, The Incorporation of National Institutions for Persons requiring Care and Control. (*Class A.*)

Rock Hall House, Combe Down, Bath. 18 males, 19 females. Managers, Bath Municipal Charity Trustees. (*Class A.*)

Long Ashton Poor Law Institution, Flax Bourton, near Bristol.—3 males, 1 female. Managers, Guardians Long Ashton Union. Superintendent, J. C. Hole. (*Class B.*)

STAFFORDSHIRE.

Burton Poor Law Institution.—2 males, imbecile; 1 female, idiot. Managers, Guardians Burton Union. Master, R. Barcham. (*Class A.*)

New Cross Institution Mental Wards, Wolverhampton.—Cases accepted only from Wolverhampton County Borough Council. Managers, Guardians of the Poor of the Wolverhampton Union. (*Class B.*)

SUFFOLK.

St. Joseph's Home, Sudbury.—11 females. Manager, Rev. A. Peacock. (*Class A.*)

Handford Home, Ranelagh Road, Ipswich—20 females. Managers, The Committee. (*Class D.*)

SURREY.

Croydon Union House, Queen's Road, Croydon.—20 males, 3 females. Managers, Croydon Board of Guardians. (*Class A.*)

Royal Earlswood Institution.—650. Managers, Board of Management. (*Class A.*)

SUSSEX.

Avonhurst, Burgess Hill.—17 private cases only, males and females under 16. Manager, Margaret Macdowall. (*Class C.*) *See also p.* 735

Hastings and St. Leonards Special School for Blind and Partially Blind Children who are also Mentally Defective, Backward, or Exceptional.—32 males and females. Manager, Principal.

See also p. 723

St. Paul's House, Upper Maze Hill, St. Leonards-on-Sea.—For delicate, backward, or exceptional senior girls. School for juniors in separate house and grounds. Managers, The Principals. (*Class C.*)

See also p. 723

WARWICK.

Agatha Stacey Homes, Rednall.—35 females; and *Enniskerry, Knowle.*—24 females. Managers, The Central Committee, 158, Broad Street, Birmingham. (*Class A.*)

Midland Counties Institution, Knowle, near Birmingham.—87 males, 54 females. Managers, The Committee. Superintendent, A. H. Williams. Medical Officer, J. O. Hollick, M.B. (*Class A.*)

Monyhull Colony, King's Heath, Birmingham.—309 males, 320 females. Managers, Guardians of the Poor of the Birmingham Union. Clerk and Solicitor, R. J. Curtis, Union Offices, Edmund Street, Birmingham. (*Class B.*)

WILTS.

Devizes Union Workhouse.—12 females. Managers, Devizes Board of Guardians. (*Class A.*)

Pewsey Union Workhouse, Pewsey.—4 females. Managers, Pewsey Board of Guardians. (*Class B.*)

Poor Law Institution, Semington, near Trowbridge.—24 females. Managers, Guardians Trowbridge and Melksham Union. Clerk, E. A. Newth, Trowbridge. (*Class B.*)

The Workhouse, Chippenham.—Managers, Guardians of the Chippenham Union. (*Class B.*)

WORCESTERSHIRE.

Evesham Union Workhouse.—Certified only for dealing with cases arising in the Evesham Union Area. J. H. Damen, Superintendent. (*Class A.*)

Poor Law Institution, Sedgley (Stafford). Indefinite. Managers, Guardians of the Dudley Union. (*Class B.*)

YORKSHIRE.

Mid-Yorkshire Institution, Whixley, York.—70 males, 50 females. Managers, The Mid-Yorkshire Joint Board. Medical Superintendent, F. P. Hearder, M.D. (*Class A.*)

The Grange, Altofts, Normanton.—15 females, good class. Mentally deficient, epileptics. Manager, Mrs. Howard. (*Class C.*)

INSTITUTIONS FOR INEBRIATES.

LICENSED UNDER THE ACTS, 1879–1900.

The patient must sign a Form expressing a wish to enter the Home, before a magistrate. This can be done at the private residence of the patient, or at the retreat, if previous notice has been given. Two friends must also sign a declaration that they consider the patient an 'Inebriate' within the meaning of the Acts.

* NOTE:—Ashford is a Roman Catholic Religious Institution.
† Cinderford, Erdington, Herne Hill, Terrington St. Clement, and Torquay are C.E.T.S. Institutions.

MALES ONLY.

Buntingford (Herts). — *Buntingford House Retreat.* Apply, Med. Supt., Dr. G. M. Smith. Access—Buntingford, G.E.R., 8 minutes.

Cinderford† (Glos.). — *Abbotswood House Inebriate Retreat.* Access—Ruspidge or Cinderford.
See also p. 736

Cockermouth (Cumberland). — *Ghyllwoods.* Res. Med. Prop., Dr. J. W. Astley Cooper. Access—Cockermouth, 11 miles. (*Closed during the War, owing to Proprietor's engagement at Military Hospital*).

Colinsburgh (Fife). — *Invernith Lodge.* Res. Med. Supt. and Licensee, Dr. W. H. Bryce. Access—Kilconquhar station, 4½ miles. (*Closed temporarily during War*).

Folkestone.—*Capel Lodge*, near Folkestone. Res. Prop., E. Norton, M.D. Access—Folkestone June., 2 miles.

Rickmansworth (Herts). — *Dalrymple House.* Apply to Res. Med. Supt. Access — Rickmansworth station, Great Central & Metropolitan Railway, ½ mile; L. & N.W.R., 1 mile.
See also p. 736

FEMALES ONLY.

Ashford (Middlesex).* — *Ecclesfield.* Med. Supt., Dr. M. F. Cock. Apply, Mother Superior. Access—Ashford station, 1 mile.
See also p. 736

Belfast. — *The Lodge Retreat*, Irwin Avenue, Strandtown. Med. Attendant, R. W. Leslie, M.D.

Beverley (E. Yorks). — *Albion House.* Med. Supt., Dr. George Savege. Hon. Sec., Mrs. T. R. Pentith, The Limes, Sutton-on-Hull.

Erdington, near Birmingham.† — *Corngreaves Lodge.* Lady Supt., Miss Knapman. Med. Off., Dr. Featherstone. Access—Gravelly Hill station, ¼ mile. *See also p.* 736

Fallowfield. — *The Grove Retreat,* near Manchester, Licensee, Mrs. Sam Gamble. Med. Offs., A. T. Wilkinson, M.D., J.W. Hamill, M.D., and Dr. Florence Robinson. Hon. Treas., Mr. Sam Gamble. Access —Fallowfield station, 10 minutes. *See also p.* 735

Herne Hill.† — *Ellison Lodge,* Half Moon Lane. Res. Supt., Miss Rossiter. Med. Supt., Dr. C. E. Finny. Access—Herne Hill, 10 minutes ; North Dulwich, 3 mins. Telephone : 1162 Brixton. *See also p.* 736

Leicester.—*Melbourne House.* Prop., Mr. H. M. Riley. Med. Attendant, R. Sevestre, M.A., M.D. Camb. London Consultant, W. Wynn Westcott, M.B. (Coroner N.E. London), 396, Camden Road, Holloway. Dublin Consultant, Sir Wm. J. Smyly, M.D., F.R.C.P.I., 58, Merrion Square, Dublin. Nat. Tel., 769 Leicester. Station, 2 miles. *See also p.* 736

Newmains (N.B.).—*Newmains Retreat* for ladies. Access — Hartwood station, Cal. Railway, 2 miles.

Reigate (Surrey). — *Duxhurst,* for women of all classes. Under the Superintendence of Lady Henry Somerset. Med. Supt., A. Walters, M.R.C.S. Access—Reigate, 4 mls. *See also p.* 735

Spelthorne St. Mary (Bedfont, Middlesex).—Apply to the Sister Superior, C.S.M.V. Access — Feltham, S.W.R., 1 mile.

Terrington St. Clement† (Norfolk). — *Hamond Lodge.* Res. Supt., Miss Yolland. Med. Supt., S. R. Lister, M.R.C.S. Access—Terrington station, 1½ miles. *See also p.* 736

Torquay.† — *Temple Lodge.* Res. Supt., Sister in Charge. Med. Off., W. Odell, F.R.C.S. Hon. Sec., Mrs. H. Erskine. *See also p.* 736

REFORMATORIES CERTIFIED UNDER THE INEBRIATES ACT, 1898.

Male and Female.

Bristol. — *Brentry Certified Inebriate Reformatory,* Westbury-on-Trym. Res. Supt., Capt. Lay ; Med. Off., Dr. Ormerod. Hon. Sec., Rev. H. N. Burden. Access—Clifton Down, Redland, or Patchway stat., 3½ mls.

Females Only.

Langho (Lancashire). — *Lancashire Inebriate Reformatory,* Langho, near Blackburn. For Lancashire cases. Res. Supt. and Med. Off., Dr. F. A. Gill. Access—Langho station, 1½ miles.

UNLICENSED HOMES.

Beckenham (Kent). — *Norwood Sanatorium,* The Mansion, Beckenham Park. Med. Supt., F. Hare, M.D. Access—Beckenham June. station, 10 minutes. *See also p.* 871

Dublin. — *Farnham House,* Finglas. Res. Med. Supt., H. P. D'Arcy Benson, M.D. Access—Dublin, 2 miles. *See also p.* 887

London.—*London Sanatorium,* 150, Harley Street, W. Res. Med. Supt., C. A. McBride, M.D.

Maldon (Essex). — *Osea Island* (for ladies and gentlemen). Vis. Phys., H. I. Price, F.R.C.S. Prop., F. N. Charrington, Esq.

SANATORIA FOR CONSUMPTION AND OTHER FORMS OF TUBERCULOSIS.

Aberchalder (N.B.). — *Inverness-shire Sanatorium.* Med. Supt., D. S. Johnston, M.D. Access—Aberchalder, 2 miles.

Aysgarth, S.O. (Yorks).—*Wensleydale Sanatorium.* Physicians, D. Dunbar, M.B., B.S., and W. N. Pickles, M.B., B.S. Access—Aysgarth, ½ mile, via Northallerton, N.E.R., and Hawes Junction, M.R.

See also p. 724

Banchory (Scotland). — *Nordraeh-on-Dee.* Res. Phys., D. Lawson, M.A., M.D. Access—Banchory, 1½ miles.

Barrasford (Northumberland). — *The Newcastle-on-Tyne and Northumberland Sanatorium.* Res. Med. Supt., Dr. Wm. B. Martin. Access—Barrasford, N.B.R., 4 miles.

Belbroughton (Worcs.).—*Bourne Castle Sanatorium.* Res. Phys., W. Bernard Knobel, M.D. Access — Hagley, G.W.R.

Benenden (Kent). — *Sanatorium* of "National Association for the Establishment and Maintenance of Sanatoria for Workers suffering from Tuberculosis." Two Res. Med. Officers. Apply, Steward-Secretary. Access—Biddenden, 3 miles.

Bingley (Yorks.)—*Eldwick Sanatorium* (school for phthisical children). Med. Off., Dr. Margaret S. Sharp. Access—Bingley station, 2 miles.

Birmingham (near).—*Romsley Hill Home for Consumptives*, Halesowen. Res. Med. Off., Dr. P. Allan. Access—Hunnington, Mid. & G.W.R., 2 miles.

Bolton (Lancs.). — *Wilkinson Sanatorium for Consumptives*, Sharples. Med. Off., Dr. J. D. Marshall.

Bournemouth.—*Royal National Sanatorium for Consumption and Diseases of Chest.* Sec., A. G. A. Major. Res. Med. Off., James C. Hoyle, M.D. Access—Bournemouth Central, 1½ miles.

The Firs Home (for advanced cases). Hon. Sec., Dr. W. Willes, Bournemouth. Hon. Med. Offs., C. P. Woodstock, M.D., and S. G. Champion, M.D. Lady Supt. Miss Ingram. Access — Bournemouth Central, ½ mile.

The Home Sanatorium, West Southbourne, near Bournemouth. Res. Med. Supt., J. E. Esslemont, M.B., Ch.B. Access—Bournemouth Central, 2½ miles; Boscombe, 1½ miles; Christchurch, 2½ miles.

See also p. 724

Bridge of Weir (Renfrewshire).—*Consumption Sanatoria of Scotland.* Hon. Treas., Sir Joseph Maclay, Bart., 21, Bothwell Street, Glasgow. Med. Supt., James Crocket, M.D. Access — Bridge of Weir, 2 miles.

Brighton. — *Municipal Sanatorium*, for Brighton townsfolk only (early pulmonary and joints). Med. Supt., Dr. Duncan Forbes, M.O.H. for Brighton. Particulars, Town Hall, Brighton.

Chagford (Devon).— *Dartmoor Sanatorium.* Res. Med. Supt., Dr. C. H. Berry. Access — Moretonhampstead, G.W.R., 6 miles.

Chelmsford (Essex). — *Great Baddow Sanatorium.* Med. Supt., A. Lyster, M.D. Access—Chelmsford, G.E.R.

Cheltenham. — *Cranham Lodge Sanatorium*, Stroud, Glos. Res. Med. Supts., A. H. Hoffmann, M.D., and Geoffrey A. Hoffmann, M.B.— Access—Cheltenham, 8 miles.

Salterley Grange Sanatorium, near Cheltenham. Res. Med. Supt., Dr. E. G. Glover. Access—Leckhampton, 2½ miles.

Chesterfield (Derbyshire). — *Ashover Sanatorium.* Med. Supt., Dr. Ida E. Fox. Access—Stretton, M.R., 3½ miles.

Danbury (Essex).—*Alfred Boyd Memorial Sanatorium* (for ladies), Little Giberacks, Essex. Med. Supt., A. Lyster, M.D.

Darlington.—*Felix House*, Middleton St. George, Co. Durham. Res. Med. Supt., C. S. Steavenson, M.B. Access—Dinsdale, N.E.R., 5 minutes.

Devon and Cornwall *Sanatorium*, Didworthy, South Brent. For consumptive poor of the two counties. Sec., S. Carlile Davis, Esq., Law Chambers, Princess Square, Plymouth. Res. Med. Supt., Dr. W. B. Livermore. Access—Brent, G.W.R., 2 miles.

Doneraile (Co. Cork).—*Cork County and City Sanatorium*, Heatherside. Res. Med. Supt., Dr. R. Ahern. Access—Buttevant, G.S. & W.R., 5 miles.

Dublin. — *Peamount Sanatorium*. Hazelhatch, Dublin. Med. Supt.. A. H. Hanley, C.M.G., F.R.C.S.I. Access—Lucan or Hazelhatch, Gt. Southern Railway.

Dundee (near), *Sidlaw Sanatorium*. Med. Supt., H. E. Fraser, M.D., Royal Infirmary, Dundee. Access —Auchterhouse station, 1½ miles.

Durham.—*Durham County Consumption Sanatoria*. Sec., Mr. F. Forrest, 54, John Street, Sunderland. For men : Stanhope, Med. Supt., Dr. John Gray. Access—Stanhope station, 1 mile. For women and children : Wolsingham, Med. Supt. Dr. Menzies. Access—Wolsingham station, ¾ mile.

Edinburgh.—*Royal Victoria Hospital for Consumption*. Under the Corporation of the City of Edinburgh, and the supervision of the Public Health Department, City Chambers, Edinburgh.

Eversley (Hants). — *Moorcote Sanatorium*. Res. Med. Supt., J. G. Garson, M.D. Access—Wellington College station, 4½ miles ; Wokingham station, 6 miles ; Fleet, 6 miles.

Farnham (Surrey).—*Whitmead Sanatorium*, Tilford, near Farnham. Med. Supt., Geo. Fleming, M.B. Access—Farnham station, 3½ mls.

Fortbreda, Belfast.— *Forster Green Hospital for Consumption and Chest Diseases*. Res. Phys., Dr. L. McCullough. Sec., J. Osborne, Scottish Provident Building, Belfast. Access—Belfast, 2 miles.

Frimley (Surrey).—*Brompton Hospital Sanatorium*. Res. Med. Supt., Dr. W. O. Meek. Access — Frimley station, 2 miles. *See also p.* 712

Grange - over - Sands. — *Westmoreland Sanatorium*. Res. Med. Supt., C. F. Walker, M.D. Access—Grange-over-Sands station, 2¾ miles.

Hastings. — *Fairlight Sanatorium*, in connection with Margaret Street Hospital for Consumption (for Out-Patients), 26, Margaret St., W. Sec., Mrs. M. C. Hawthorne. Med. Off., Dr. N. F. Stallard. Access—Hastings, tram, about 15 minutes.

Heswall (Cheshire). — *West Derby, Liverpool, and Toxteth Park Joint Sanatorium for Children*. Med. Supt., J. B. Yeoman, M.D. Matron Miss Bateson. Access—Heswall. 1½ miles.

Hull. — *Hull and East Riding Convalescent Home*, Withernsea. Sec., Benjamin Brooks, Royal Infirmary, Hull. Med. Off., A. E. Sproulle, L.R.C.P. Access—Withernsea stat.

Isle of Wight. — *Royal National Hospital for Consumption*, Ventnor. Senr. Res. Med. Off., Dr. Arthur Hawkins. Sec.. Charles W. Cox. 18, Buckingham Street, Strand, W.C. Access—Ventnor, 1 mile.

St. Catherine's Home, Ventnor (for early cases of phthisis in children). Apply Sister-in-Charge. Med. Off., H. F. Bassano, M.A., M.B. Access—Ventnor, 5 mins. drive.

Kingussie, N.B. — *Grampian Sanatorium*. Res. Med. Supt., W. de Watteville, M.D.

Kinross-shire (Scotland).— *Ochil Hills Sanatorium*, Milnathort. Res. Med. Supt., Dr. Ian Struthers Stewart. Access—Kinross junction, 4 miles.

Kirkcaldy.—*Sanatorium for Consumption*. Med. Supt., Dr. G. W. McIntosh. Sec., The Town Clerk. Access—Kirkcaldy, 1 mile.

Lanark.—*City of Glasgow Sanatorium*, Bellefield, Lanark. Res. Med. Supt., Dr. J. W. Allan. Access—Lanark, 20 minutes.

Lanchester (Durham). — *Maiden Law Sanatorium*. Med. Off., Dr. W. M. Morison. Sec., W. H. Ritson. Access — Annfield Plain station, 1 mile.

Leeds. — *Leeds Sanatorium for Consumptives*, Gateforth, near Selby, and *Leeds Hospital for Consumptives*, Armley. For poor of Leeds. Sec., C. H. Sedgwick, 37, Great George St., Leeds.

Liverpool. — *Liverpool Sanatorium for Consumptives*, Kingswood, Frodsham. Sec., Liverpool Hospital for Consumption, Mount Pleasant, Liverpool. Acting Res. Physician, R. F. C. Talbot, M.D. Access—Frodsham, L. & N.W.R., 3½ miles.

Park Hill Sanatorium, Liverpool. Acting Med. Supt., Walter Crane, M.D.

Llanybyther (Carmarthenshire). — *West Wales Sanatorium*. The Welsh National Memorial to King Edward VII. Res. Med. Supt., Dr. H. O. Blanford. Access — Llanbyther station, 3 miles.

London. — *City of London Hospital for Diseases of Chest*, Victoria Park, E. Res. Med. Off., Dr. S. Rooldhouse Gloyne. Sec., Geo. Watts. Access—Cambridge Heath, Bus or Tram, 5 mins.

Mount Vernon Hospital for Consumption and Diseases of the Chest, Northwood. Access — Northwood (Met. & G.C. Rly.). Hon. Vis. and Res. Staff. Out-patient department, 7, Fitzroy Square, W. Secretary, W. J. Morton.

Royal Hospital for Diseases of the Chest, 231, City Road, E.C. Apply to the Secretary.

Long Stratton (Norfolk). — *Fritton Sanatorium*. Med. Director, Dr. Annie McCall, 165, Clapham Road, S.W. Access — Fornecett station, G.E.R., 4 miles.

Manchester. — *Hospital for Consumption and Diseases of Throat and Chest*, Bowdon; *Crossley Sanatorium*, Delamere, Cheshire. (For poor and working classes, after personal examination at Manchester.) Sec., C. W. Hunt, Manchester. Res. Phys. (Bowdon), Dr. A. Vrebos; (Delamere), G. Heathcote, L.R.C.P. & S.

Margate (Kent). — *Royal Sea-bathing Hospital* (for Surgical Tuberculosis). Sec., A. Nash, 13, Charing Cross, S.W. Access — Margate West, ¼ mile.

Mendip Hills. — *Mendip Hills Sanatorium*, Wells, Somerset. Res. Phys., D. J. Chowry Muthu, M.D. Access—Wells station, 2¾ miles.

See also p. 725

Nordrach-upon-Mendip, Blagdon, near Bristol. Res. Phys., R. Thurnam, M.D. Access—Burrington station, 5 miles.

Midhurst (Sussex). — *King Edward VII Sanatorium*. Res. Med. Supt., N. D. Bardswell, M.D. Access—Midhurst, 4 miles.

Nayland (Suffolk). — *East Anglian Sanatorium, and Maltings Farm Sanatorium* for poorer men and women patients, *and East Anglian Children's Sanatorium*. Med. Supt., Dr. Jane Walker, 122, Harley Street, W. Access—Bures station, G.E.R., 3½ miles.

New Cumnock (Ayrshire). — *Ayrshire Sanatorium*, Glenafton. Res. Med. Supt., E. E. Prest, M.D. Access—New Cumnock, 3 miles.

Norfolk. — *Keiling Sanatorium*, Holt. Acting Res. Med. Supt., Dr. W. J. Fanning. Access—Holt, 1½ miles.

Mundesley Sanatorium, Mundesley. Res. Phys., S. Vere Pearson, M.D. Access—Mundesley, 1 mile.

Northampton. — *Northamptonshire Sanatorium*, Creaton. Res. Med. Supt., Dr. J. A. Kilpatrick. Access—Brixworth, L. & N.W.R., 3 miles.

Nottingham. — *Ransom Sanatorium*, Sherwood Forest, Mansfield. Res. Med. Off., Dr. Ethel Dukes. Access—Mansfield, 3 miles.

Oban, Scotland. — *Argyll County Sanatorium*. Vis. Med. Off., Duncan MacDonald, M.D. Access—Oban, 1 mile.

Ockley (Surrey). — *Ockley Sanatorium*. Res. Med. Supt., Dr. Clara Hind. Access—Ockley, L.B. & S.C.R., 1 mile.

Painswick, near Stroud (Glos.).—*Painswick Sanatorium.* Res. Phys. and Prop., W. McCall, M.D. Access—Stroud, 4 miles; Gloucester, 6 miles.

Peebles.—*Manor Valley Sanatorium.* Med. Off., C. B. Gunn, M.D.

Penmaenmawr (N. Wales).—*Nordrach in Wales, Pendyffryn Hall.* Res. Phys., Dr. G. Magill Dobson, and Dr. Geraty.

Peppard Common (Oxon).— *Berks. and Bucks. Joint Sanatorium.* Res. Chief Med. Officer, Dr. Esther Carling. Access—Reading, 6½ miles.

Ringwood (Hants).— *Linford Sanatorium.* Res. Phys., H. G. Felkin, M.D., A. de W. Snowden, M.D., and H. A. F. Wilson, M.R.C.S. Access—Ringwood station, 2½ miles.

Rudgwick (Sussex).—*Rudgwick Sanatorium.* Vis. London Phys., Dr. Annie McCall, 165, Clapham Road, S.W. Access—Rudgwick station, 5 minutes; Horsham stat., 7 miles.

Ruthin (N. Wales).— *Vale of Clwyd Sanatorium, Llanbedr Hall.* Res. Prop., Dr. G. A. Crace-Calvert. Access—Ruthin station, 2 miles. *See also p.* 724

St. Leonards.—*Eversfield Chest Hospital,* West Hill. Res. Phys., T. Gambier, M.D. Access — West St. Leonards, S.E.R., West Marina, L.B. and S.C.R., within 5 minutes, walk.

Sandon, near Chelmsford (Essex).— *Merivale Sanatorium.* Res. Phys., H. N. Marrett, M.R.C.S. Access—Chelmsford station, G.E.R., 3½ miles. *See also p.* xxxv

Sheffield.— *City Hospitals for Consumptives,* Crimicar Lane (for males); Commonside (for females). Med. Supt., H. J. E. H. Williams, M.D. Tuberculosis Med. Off., J. Rennie, M.D.

Shirlett, near Broseley (Shropshire).— *King Edward VII Memorial Sanatorium.* Res. Med. Supt., Dr. T. R. Elliott. Access — Much Wenlock station, 3 miles.

Skipton (Yorks).—*Eastby Sanatorium.* Res. Med. Supt., Dr. Catharine Arnott. Access—Embsay station, 2 miles.

Stannington (Northumberland).— "*Philipson*" *Children's Sanatorium.* Matron, Miss S. M. Robson. Two Vis. Physicians. Access—Stannington station, 3 miles.

Threlkeld (Cumberland).— *Blencathra Sanatorium.* Res. Med. Supt., Dr. W. Goodchild. Access—Threlkeld, C.K. & P.R., 2 miles.

Torquay.—*Western Hospital for Incipient Consumption,* Torquay. Open Oct. to May. Sec., F. Manley. (*Temporarily in use as a War Hospital.*)

Warrenpoint (Co. Down).— *Rostrevor Sanatorium.* Res. Phys., B. H. Steede, M.D. Access—Warrenpoint. *See also p.* 725

Wicklow.—*The Royal National Hospital for Consumption for Ireland.* Newcastle, Wicklow. Res. Med. Off., Dr. F. O'B. Kennedy. Access—D. & S.E.R. to Newcastle, Co. Wicklow, 3 miles.

Winsley, near Bath.—*Winsley Sanatorium.* Senr. Res. Med. Off., Dr. H. W. M. Rees. Sec., Frederic Jones. Access — Limpley Stoke station, 1 mile.

Wokingham.—*Pinewood Sanatorium.* Res. Med. Supt., F. K. Etlinger, M.R.C.S. Access — Wellington College, S.E.R., 2 miles; or Wokingham, S.W.R., 3½ miles.

Worcester (near).—*Knightwick Sanatorium.* Res. Med. Supt., Dr. H. Gordon-Smith. Access—Knightwick, N.W.R., 1½ mile.

HYDROPATHIC ESTABLISHMENTS.

Ben Rhydding (Yorkshire).—*Ben Rhydding Hydro.* Phys., Dr. F. J. Stansfield and Dr. W. R. Bates. Access—Station, a few hundred yards.

Birmingham.—*The City Hydropathic and Massage Establishment*, 275, Broad Street. Proprietor, Robert Schenkel (*Swiss*). *See also p.* 721

Bournemouth (Hampshire). — *Bournemouth Hydropathic.* Res. Phys., W. J. Smyth, M.D. Access—East station, 1½ miles; West station, ¼ mile.

Bristol. — *The Bristol Hydropathic* College Green. Res. Phys., W. J. Spoor, M.B., M.R.C.S. Access—Temple Meads, 1¼ miles.

Bute.— *Kyles of Bute Hydropathic*, Port Bannatyne, Rothesay. Man., A. Menzies. Med. Supt., Dr. A. J. Hall. Access—Clyde steamers call daily.

Buxton.—*Buxton Hydro Hotel.* Manager, G. W. Bosworth. Access—Station, 4 minutes.

Caterham (Surrey).—*Caterham Sanitarium and Surrey Hills Hydropathic.* Res. Med. Supt., A. B. Olsen, M.D. Access — Caterham station. *See also p.* 734

Clifton (near Bristol). — *Clifton Grand Spa and Hydropathic.* Access—Clifton Down station, 1 mile; Bristol station, 1½ miles.

Cork.—*St. Ann's Hill Hydropathic.* Res. Med. Supt., Dr. R. H. Barter. Access—Blarney station, 2½ miles; Muskerry Light Railway from Cork, 8 miles.

Crieff.—*Strathearn Hydro* (17 miles from Perth). Res. Med. Supt., T. Gordon Meikle, M.B., C.M. Access—Crieff station, 1 mile.

Eastbourne.—*Eastbourne Hydropathic.* Manager, W. J. Grimes. Access—Eastbourne stat., 5 mins.' drive.

Edinburgh. — *Hydropathic*, Slateford. Man. Director, J. Bell. Access—Merchiston, 1 mile; Waverley, 3 miles.

Forres.—*Cluny Hill Hydropathic.* Vis. Phys., Dr. John Adam. Access—Forres station, 1 mile; Inverness, 24 miles. *See also p.* 730

Grange-over-Sands.—*Hazlewood Hydropathic.* Access—Carnforth, L. & N.W.R., then by Furness Railway; Grange-over-Sands, ¼ mile.

Harrogate (Yorkshire.)—*Harlow Manor Hydro.* Man., Miss Oakley.

The Harrogate Hydropathic Lim. Phys., Dr. Hindley Walker. Man., W. Taylor. Access—Harrogate station, ½ mile.

Hexham (Northumberland).— *Tynedale Hydropathic.* Prop., F. G. Grant. Med. Supt., Dr. D. Stewart. Access—Hexham, 1 mile; Newcastle, 19 miles.

Ilfracombe.—*The Cliffe Hydro.* Med. Supt., Chas. W. E. Toller, M.D. Apply to the Secretary. Station, 1 mile. *See also p.* 7 4

Ilkley (Yorkshire).— *Craiglands Hydro.* Res. Physicians, Henry Dobson, M.D., C.M. (Edin.). and Maurice R. Dobson, M.B., B.S. (Lond.), L.R.C.P., M.R.C.S, (Eng.). *See also p.* 729

The Spa Hydro. Hotel, Ilkley, Manager, J. S. Brodie. Vis. Phys.. Dr. Henry Veale. Access—Ilkley, 3 minutes.

Limpley Stoke (near Bath).— *West of England Hydropathic.* Access—Limpley Stoke station. Apply, the Secretary.

Malvern.—*The Malvern Hydropathic.* Res. Phys., J. C. Fergusson, M.D. Access—Great Malvern station, ¼ mile.

Wyche-side Hydropathic. Access—Malvern Wells station, G.W.R., ½ mile; Great Malvern station, 2 miles.

Matlock.— *Rockside Hydropathic*, Matlock. Med. Supts., Drs. Marie Goodwin, and Dr. Marie Goodwin Orene (Resident) and Dr. Morton. Access—Matlock, ¾ mile.

Royal Hotel and Baths, Matlock Bath. Phys., W. C. Sharpe, M.D. Access—Matlock Bath station.

Smedley's Hydropathic, Matlock. Res. and Vis. Physicians. Access—Matlock station, ½ mile ; omnibus. *See also p.* 728

Moffat.— *The Moffat Hydropathic.* Man., Miss Gardner. Med. Supt., Dr. D. Huskie. Access—Moffat station, 1 mile.

Peebles.—*Peebles Hotel Hydropathic.* Complete modern equipment of baths and electrical treatment. Plombières treatment for mucous colitis. Fango di Battaglia (mud packs for sciatica, etc.). Res. Phys., Thomas D. Luke, M.D., F.R.C.S. Edin. Access—N.B. and Cal. stations about 10 to 15 mins. walk. *See also p.* 727

Shandon.— *Shandon Hydropathic.* Consulting Phys., Dr. Wm. R. Sewell. Access—Shandon, 5 mins.

Southport (Birkdale Park).— *Smedley Hydropathic.* Phys., J. G. G. Corkhill, M.D. Southport or Birkdale stations. *See also p.* 725

Kenworthy's Hydropathic, Southport. Res. Phys., Dr. Kenworthy. Access—Chapel Street (L. & Y.), Lord St. station (Cheshire Lines), ¼ mile. Telephone : 80. Telegrams : "Kenworthy's, Southport." *See also p.* 725

Tunbridge Wells.— *The Spa.* Access —Station, about 1 mile ; London, 34 miles. Apply, Manager.

Ulverston.— *Conishead Priory Hydropathic.* Visiting Physician, Dr. R. Ashburner. Access—Ulverston station, 1¾ miles.

NURSING INSTITUTIONS AND PRIVATE HOMES FOR INVALIDS.

NURSING INSTITUTIONS.

Leeds.—*Leeds Trained Nurses' Institution*, 21, Hyde Terrace, Leeds. Apply Superintendent. Tel. 177. Telegrams : "Expert, Leeds." *See also p.* 719

London.—*Associated Male Nurses and Masseurs* (Trained at The National Hospital), 36, Grafton Rd., Acton. W. Secretary, A. Sharman. *See also p.* 718

Co-operation of Temperance Male and Female Nurses, 60, Weymouth Street, W. Secretary, M. Sullivan.

Incorporated Society of Trained Masseuses, 157, Great Portland Street, W. *See also p.* 716

Male Nurses' Association, 29, York Street, Baker Street, W. Sec., W. J. Hicks. *See also p.* 717

Mental Nurses' Co-operation, 49, Norfolk Square, W. Lady Supt. Miss Jean Hastie. Access—Paddington, 7 minutes. *See also p.* 719

National Temperance Male and Female Nurses' Association, 27, Cambridge Gardens, W. Sec., R. H. McKie.

St. Luke's Hospital, Old Street, E.C. Trained Nurses for Mental and Nervous Cases. Apply Matron.

Temperance Male Nurses' Co-operation, Ltd., 43, New Cavendish Street, W. ; also at Manchester, Glasgow, and Dublin. Secretary, M. D. Gold. *See also p.* xxxvi

The Nurses' Association, 29, York St., Baker St., W. Secretary, W. J. Hicks; Supt., Mrs. Millicent Hicks. *See also p.* 717

York.—*The Retreat* (Trained Nurses' Department, for mental and nervous cases only). *See also p.* 746

PRIVATE HOMES FOR INVALIDS, MATERNITY HOMES, INSTITUTIONS FOR SPECIAL TREATMENTS, Etc.

Alderley Edge (Cheshire).—*The David Lewis Colony* (for Sane Epileptics), and *Colthurst House School* (for epileptic boys). Director, Alan McDougall, M.D. Access—Warford, near Alderley Edge, Cheshire.
See also p. 723

Alresford (Hants).—*Beauworth Manor.* Invalids, any cases except insanity. Speciality: Neurosis. Apply Res. Superintendent. Access—Alresford, 5 miles. *See also p.* 721

Bath.—*Lansdown Hospital and Nursing Home*, Bath (invalids only; special arrangements for patients suffering from gout, rheumatism, and physical infirmities). Med. Supts., Dr. Percy Wilde and Dr. Wells-Beville. Access—M. or G.W. stations, 1 mile. *See also p.* 718

Church Stretton (Salop). — *Church Stretton Nursing Home*, "Ashford House." Apply, Misses Nicholls and Silverlock.

Edinburgh. — *Queensberry Lodge*, for ladies. Supt., A. Miller. Med. Supt., Dr. William Russell. Access—Waverley station, ½ mile.
See also p. 720

Epsom (Surrey).—*Ibele Grove.* Nerve Cases of all kinds, as well as Invalids, received into retired Physician's Home. Apply to Resident Physician.
See also p. 733

Guildford.—*Kia-Ora Nursing Home*, 14, Stoke Road. Medical, surgical, maternity, and rest cure patients. Principal, Miss Wilcox.

Hadlow Down, Buxted (Sussex).—*South Beacon* (for the care and treatment of gentlemen mentally affected, but not ill enough to be certified). Prop., Philip H. Harmer. Access—Buxted, 3 miles; Mayfield, 4 miles; Heathfield, 4 miles.
See also p. 722

Jedburgh.—*Abbey Green* (for Invalids and War Convalescents). Res. Prop., Wm. Blair, M.D. Access—N.B.R., Jedburgh. Telephone: No. 3. *See also p.* 721

London.—*Faraday House*, 85, West Side, Clapham Common, S.W. Medical, electricity, radiant heat, radium, Weir Mitchell, and Nauheim treatment. Apply Secretary.
See also p. 719

Radium Institute, 16, Riding House Street, W. Med. Supt., A. E. Hayward Pinch, F.R.C.S.
See also p. 719

St. Thomas's Home, St. Thomas's Hospital, Westminster Bridge. Apply, The Steward, St. Thomas's Hospital, S.E. Access—Waterloo, 5 minutes. Tel.: Hop. 1637.
See also p. 720

New Brighton. — *Convalescent Home for Women and Children.* Hon. Sec. and Treas., Frank Holt, Esq., 8, Cook Street, Liverpool. Lady Supt., Miss K. R. Bolton.
See also p. 720

Peebles, N.B.—*St. Ronan's* (for two or three mild mental cases). Med. Supt., Thomas D. Luke, M.D. Access—Peebles, ¼ mile.
See also p. 722

Ryde, I.W. — *St. Luke's Home* for epileptic churchwomen, Ryde, I.W. Med. Supt., S. Churchill, M.A., M.B. (Cantab.). Address, Deaconess.
See also p. 723

Tunbridge Wells. — *Mount Ephraim Nursing Home*, 8, Molyneux Park. Medical, surgical, Weir-Mitchell, and massage cases. Excellent facilities for open-air treatment. Apply, Miss Baxter. Access — S.E. & Chatham Station, 10 mins.
See also p. 721

PRINCIPAL BRITISH SPAS,

With Indications for their Therapeutical Employment.

Revised by N. Hay Forbes, F.R.C.S. Edin., F.R.S. Edin. (Church Stretton).

Bath (Somerset). — Sheltered from the N. and N.E. winds by a range of hills from 600 to 800 feet high; 2 hours from London (Paddington), 12 miles from Bristol. Rainfall, 32·7 inches in 1914, and sunshine, 1666 hours. Climate mild and equable.

Waters.—The only *hot* springs, and the only *winter* spa, in Great Britain. Three springs yield over half a million gallons of water daily; the temperature of the hottest is 120° F. The waters contain sulphates of calcium, strontium, sodium, and potassium, with calcium carbonate, the chlorides of magnesium, sodium, and lithium.

Therapeutic indications.—Gout, chronic rheumatism, rheumatoid arthritis, sciatica, disorders of the digestive organs, anæmia, skin diseases, functional nervous disorders and debility.

Baths.—Modern baths of every description, including Aix douche massage, deep baths, electric, water and hot air, natural vapour, needle, intestinal douches for muco-membranous colitis and allied conditions, sulphur, Nauheim, and Zander medico-mechanical treatment.

Nursing and Baths.—Lansdown Grove House (*See p.* 718).

Bridge of Allan (Stirlingshire). — 422 miles from London, 3 miles north of Stirling. Sheltered from the north and east winds by the Ochil Hills. On the direct route to London, and within an hour's rail journey of Edinburgh and Glasgow. Average rainfall 33·24 inches. Climate mild and equable all the year.

Waters.—Natural mineral waters from six springs (Airthrey), at a depth of about 116 feet, exceedingly rich in saline, the chief ingredients being various salts of calcium, sodium, and magnesium. These waters are once more coming into great prominence.

Therapeutic indications.—Chronic affections of the liver, stomach, and bowels, in many chest diseases, and in rheumatism, gout, sciatica, and other nerve affections, also in some diseases of the skin.

Baths.—Excellent suite of baths, with skilled attendants.

Buxton (Derbyshire) (*See also p.* 732).—The Mountain Spa, 1000 feet above sea level, 3½ hours from London (St. Pancras), 23 miles from Manchester, 30 from Sheffield, 53 from Liverpool. Bracing climate. Rainfall, 52·7 inches in 1915, and 1078 hours of sunshine. Lowest absolute humidity of any health resort in Great Britain.

Waters.—Thermal springs 82° F. Powerful radio-active properties. More highly charged with nitrogen gas than any other spring. Chalybeate spring, rich in protocarbonate of iron.

Therapeutic indications.—Gout, rheumatism, rheumatoid arthritis, sciatica, nervous diseases, skin diseases, especially those of gouty origin, malaria and other tropical diseases, colitis, anæmia, phlebitis, and diseases of women.

Baths.—Over 90 different treatments. Every porved treatment installed. Recent official report of Devonshire Hospital gives percentage of cures as 88·6 per cent extending over last five years. (*See also p.* 732.)

Boarding Establishment.—The Buckingham Boarding Establishment (*See p.* 734).

Cheltenham (Gloucestershire).—184 feet above sea level, 3 hours from London. Rainfall, 27·5 inches in 1914, and sunshine, 1576 hours. Town very free from fogs. Protected from N. and N.E. winds. Good water supply and modern sanitation.

Waters.—The mineral waters are of two kinds. One is alkaline (Pittville) from contained sodium carbonate, the only one of this type in Great Britain. The other is impregnated with the sulphates of soda and magnesia. They are now receiving considerable attention from the medical profession, and seem likely to successfully compete with Carlsbad, Marienbad, and Vichy in attracting a portion of the patients formerly sent abroad.

Therapeutic indications.—Gout, dyspepsia, metabolic disorders generally, chronic gastric and hepatic troubles, and neurasthenia.

Baths.—Good modern baths, with massage.

Church Stretton (Salop).— 613 feet above sea level, in the 'Highlands of England,' 4¼ hours from Euston, 3¾ hours from Paddington, 1½ hours from Birmingham, 2½ hours from Liverpool and Manchester, and 2½ hours from Bristol. Air noted for its extreme purity, bracing, with a somewhat tranquillizing influence, and a generally invigorating climate. Hills 1250 to 1700 feet high. Prevailing wind, S.W. Rainfall, 35·18 inches in 1914. Modern drainage. Porous soil.

Waters.—Said to be the purest in Great Britain. Found to be useful in gout, rheumatism, chronic renal affections, arterio-sclerosis, and gastric catarrh.

Therapeutic indications.—Specially the 'open-air' cure of neurasthenia, for sequelæ of influenza, for insomnia, functional nervous diseases, chronic gout and rheumatism, chronic gastric and bronchial catarrh, debility from over-work, and convalescence after illness or operation. 'Terrain cure,' and special physical exercises for obesity, myocardial atony, early arterioselerosis, hepatic inadequacy and constipation. A good 'after-cure' resort from Bath, Buxton, Cheltenham, Droitwich, Leamington, and Llandrindod Wells.

Droitwich (Worcestershire) (*See also p.* 731).—150 feet above sea level, 2½ hours from London (Paddington), 19 miles from Birmingham, 6 from Worcester. Rainfall about 23 inches. Mean winter temperature 47° F., summer 69·9° F. Well protected from N. and N.E. winds.

Waters.—The most powerful saline in the world. The brine is pumped from 200 feet below the ground level. Temperature 54° F., and is heated by introducing steam. It is 10 to 12 times as strong as that of the ocean (Channel), containing in every gallon 20,000 grains of saline in excess of any known waters: the waters possess radio-active properties.

Therapeutic indications.—Chronic muscular and articular rheumatism, rheumatoid arthritis, chronic articular or irregular gout, neuritis, sciatica neuralgia, heart diseases, especially those of myocardium—effect similar and equal to Nauheim treatment—neurasthenia, anæmia, chlorosis, some sclerotic diseases of spinal cord, dry, scaly skin diseases, e.g., chronic eczema and psoriasis.

Baths.—Immersion, douche, needle, vapour, swimming, Aix-douche, Nauheim baths, etc.

Hotel.—Worcestershire Brine Baths Hotel, and Brine Baths (*See p.* 731).

Harrogate (Yorkshire). (*See also p.* 731).—450 feet above sea level, 4 hours, from London, 18 miles from Leeds. Unequalled by any Continental spa, especially for the treatment of gout and its complications. The climate is stimulating and fairly dry—bracing moorland air. Rainfall in 1914, 31·22 inches, and sunshine, 1468 hours.

Waters.—Celebrated for the medicinal properties of its 87 springs—sulphurous, chalybeate, alkaline, and saline. 'Aquaperia' aperient mineral water is bottled at Harrogate by Camwal Ltd. (*See p.* 795).

Therapeutic indications.—Anæmia, chlorosis, gout, rheumatism, disorders of liver and stomach, muco-membranous colitis, chronic appendicitis, and skin diseases.

Baths.—There are four establishments, where nearly 70 treatments are given, including sulphur baths, douche, Nauheim, vapour, Russian, Turkish, electric, mineral, electric light, ozone, throat and nasal (*See also p.* 863).

Ilkley (Yorkshire).— Situated on the southern slope of the valley of the Wharfe, rising rapidly from the bank of the river to a height of 1320 feet above sea level. Occupying a sheltered position. Annual rainfall, about 32 inches. Mean annual temperature 48° F. Death-rate 8 per 1000. Being close to extensive moors the air is bracing and exhilarating and at the same time dry and soft, having a wonderfully restorative effect upon invalids as well as on Anglo-Indians, delicate children, and convalescents.

Waters.—The water supply obtained from springs is remarkably pure, bright and sparkling. Chalybeate waters. Saline.

Therapeutic indications.—Gout, rheumatism, neuritis, neurasthenia, anæmia, asthma, and bronchitis cases are benefited. The treatment adopted is that known as hydro-therapeutic.

Baths.—Complete suites of baths are to be found in the numerous establishments. Electrical, Weir-Mitchell.

Hydropathic Establishment.—Craiglands Hydropathic (*See p.* 729).

Leamington Spa (Warwickshire) (*See also p.* xxxv.)—195 feet above sea level, 1 hour 30 minutes from London (Paddington or Euston), 24 miles from Birmingham. Equable and mild climate, with low rainfall, 24·6 inches in 1914, total bright sunshine 1495 hours. Westerly winds prevail.

Waters.—Saline, resembling those of Homburg, but more generally useful.

Therapeutic indications.—Muscular and articular rheumatism, gout, rheumatoid arthritis, neuralgia and neuritis, diseases arising from a plethoric condition of the chylopoietic viscera; eczema and other irritative disorders of the skin, conditions of increased vascular tension and chronic interstitial nephritis.

Baths.—Turkish, medicated, swimming, and electric of all kinds (*See also p.* xxxvii).

Llandrindod Wells (Radnorshire).—Situated in Central Wales, at an altitude of 750 feet. About 5 hours from London. It lies in the centre of a plateau of hills rising in places to over 2000 feet. Sheltered from the east, and open to the south and west. The soil is porous, and dries up quickly after rain. The climate is extremely bracing. Rainfall, 41·11 inches in 1913.

Waters.—There is a great variety of mineral waters—saline, sulphurous, iron, magnesium, chloride of calcium, and lithia springs similar in composition to those at Kissingen and Homburg. Slightly aperient and strongly diuretic.

Therapeutic indications.—The diseases most benefited are those in which any digestive derangements are present, the various forms of gout and rheumatism, rheumatoid arthritis, neuritis and fibrositis, gall-stones and biliary stasis, renal calculus, or any kidney or bladder condition requiring diuresis, and in neurasthenia, or debility from over-work or convalescence.

Llangammarch Wells (Breconshire).—In an open valley surrounded by moorland, 600 feet above sea level. 5¾ hours from London. Mean annual temperature in 1914, 48·1° F. Sunshine in 1914, 1320 hours, and rainfall 58·6 inches in 1914. Well protected from the east, and prevailing wind is S.W.

Water.—Saline, containing the chlorides of barium (6¾ grains per gallon), calcium, magnesium, lithium, and sodium ; the only one of its kind in the British Isles. The barium salt has a physiological action on cardiac muscle similar to that of digitalis and strophanthus, and is also a good diuretic. Administered both internally and externally. Temperature 56° F. ; is heated for bathing purposes. A modified Nauheim system of baths (immersion, douche, and needle), exercises, massage, and hill climbing is carried out.

Therapeutic indications.—Cardiac diseases, organic and inorganic, especially affections of the myocardium due to influenza. Graves's disease, chronic muscular and articular rheumatism, osteo-arthritis, gout, sciatica, and neurasthenia.

Hotel.—Lake Hotel (*See p.* 730).

Malvern (Worcestershire).—Situated at an altitude of 520 feet above sea level, on eastern slope of Malvern Hills (9 miles long and rising to 1400 ft.), 2½ hours from London (Paddington), and about 1 hour from Birmingham. Original home of hydropathy. Soil gravelly (syenitic detritus). Air dry and bracing, cool in summer and warm in winter. Rainfall, 30 inches in 1914. Mean annual temperature 50·6° with low daily variation, daily mean of bright sunshine in 1914, 4·47 hours. Total sunshine in 1914 1631 hours. Lowest death-rate of any inland watering-place. Sanitation perfect.

Waters.—Mainly spring, of remarkable purity, free from organic matter, less than 4 grains of earthy salts per gallon.

Therapeutic indications.—Gout, rheumatism, rheumatoid arthritis, neuralgia, sciatica, lumbago, dyspepsia, constipation, anæmia, bronchial nephritic, and cutaneous diseases.

Baths.—Natural pure brine (from Droitwich), Turkish and electric baths. Vichy massage and Aix douches, Fango-di-Battaglia.

Matlock Bath (Derbyshire).—300 to 800 ft. above sea level, 3½ hours from London (St. Pancras), 46 miles from Manchester, 16 from Derby. Rainfall in 1914, 35·0 inches, and sunshine, 1321 hours. Very sheltered.

Waters.—Thermal Springs. Mild sulphated alkaline—saline waters at 68° F., containing 33 grains per gallon of salts, mainly magnesium and calcium bicarbonate, and magnesium sulphate. Owing to their peculiarly soft and unctuous character they are especially valuable in bathing and douche operations, particularly those associated with massage, such as the 'Aix' and 'Vichy' douches.

Therapeutic indications.—Rheumatism, gout, rheumatoid arthritis, neuritis, neurasthenia, catarrhs (bronchial, gastric, or enteric), anæmia, cardiac asthenia, chronic diseases of the liver or kidneys, digestive and biliary disorders.

Baths.—A complete modern installation exists for the administration of all kinds of baths, douches, packs, and other hydropathic treatment, electricity, massage, inhalations, Nauheim baths, with Swedish exercises.

Fango-di-Battaglia.—The volcanic mineral deposit from the hot springs near Padua (N. Italy) is imported, and extensively used in the treatment of gout, rheumatoid arthritis, and neuritis.

Matlock Bank (*Matlock* station, one mile by rail from Matlock Bath).—300 to 800 feet above sea level, 3½ hours from London (St. Pancras), 45 miles from Manchester, 17 from Derby. South-westerly aspect, and well sheltered from the north. Climate mildly bracing. Sunshine above the average. The Matlock system of hydropathic treatment is carried out in all its branches, and the principal Hydros are installed with latest electric baths and appliances, including high-frequency, Dowsing radiant heat and light. Schnee four-cell, *x* rays, etc. They also include Turkish, Russian, plunge, medicated and inhalation baths, Aix and Vichy douches.

A feature of the Matlock Hydros is that, as a rule, they are complete in their own grounds, and contain croquet and tennis lawns, and bowling and putting greens, which, as a means of recreation and exercise, form a valuable auxiliary to a course of hydropathic treatment.

Hydropathic Establishments.—Smedley's Hydropathic (*See p.* 728).

Peebles (Peebleshire, N.B.).—500 ft. above sea level. One hour from Edinburgh and 8 from London (via Galashiels). Rainfall, 27 inches. Bracing climate, but sheltered from the north winds. Mean annual mortality rate 11 per mil. Population 6000 in winter, and 10,000 in summer.

Waters.—The waters are of the halothermal type, similar to Kissingen and Kreuznach. The chief ingredient is chloride of sodium. They are obtained from the famous St. Ronan's Well (6 miles east).

Therapeutic indications.—The waters are specially suited to the Nauheim and Bourbon Lancy treatment of cardiac disease, and in this respect seem likely to compete with the above-mentioned continental resorts, patients being saved the long journey, and also, after the baths, are conveyed by lift immediately to their rooms for resting. The waters are also suited to dyspepsia, gout, rheumatism and neurasthenia.

Baths.—The baths at the hydropathic are of the most modern type. Complete electrical installation and mud baths (Fango-di-Battaglia).

Hydropathic Establishment.—Peebles Hotel Hydropathic (*See* p. 727).

Nursing Home.—St. Ronan's, Peebles (*See p.* 722).

Ripon (Yorkshire) (*See also p.* 729).—Situated on rising ground near the junction of the Rivers Ure and Skell. On the N.E. Railway, 4¾ hours from London. 120 feet above sea level. Climate mild but bracing. Soil, gravel and sand, and dries quickly after rain. Prevailing winds, W. and S.W. Surrounding country well wooded and very beautiful, Fountains Abbey and many other places of interest are within easy reach. The Yorkshire Moors are only a few miles from the City.

Waters.—Saline Sulphur Water brought down from Aldfield Spa, 4 miles distant, to the New Baths erected in 1904.

Therapeutic indications.—Chronic and subacute gout, rheumatism, rheumatoid arthritis, chronic skin diseases (eczema, psoriasis, acne), catarrhs, gastric and liver derangements.

The Baths have been lately equipped with up-to-date electric apparatus. (*See also p.* 729).

Strathpeffer Spa (Ross-shire, N.B.).—In the Highlands of Scotland. 180 to 300 feet above sea level. Sheltered from N. and N.E. winds. Prevailing wind S.W. Sandy soil. Bracing air. Sunshine in 1914, 1167 hours, and rainfall, 30 inches.

Waters.—Sulphurous and chalybeate. Former very rich in sulphuretted hydrogen gas and sulphates. Four sulphur wells in use: (1) Old well; (2) Upper; (3) Strong; (4) Cromartie. No. 4 contains over 19 cubic inches H_2S to gallon. Sulphates, the predominating salt. Have strong diuretic and mild aperient action.

Therapeutic indications.—Chronic and subacute gout and rheumatism (especially articular), rheumatoid arthritis, chronic skin diseases (eczema, acne, psoriasis), especially when gouty or rheumatic, chronic disorders of the digestive system, chronic gastric or intestinal catarrh, sluggish portal circulation, congested liver, biliary and urinary calculi, neurasthenia, anæmia, obesity, chronic metallic poisoning, dilatation of heart, neuritis.

Baths.—Sulphurous (immersion), inhalation, peat, douche (Aix and Vichy), needle, pine, Russian, Nauheim, radiant heat (electric), and high-frequency current.

Trefriw Wells (Carnarvonshire).—A chalybeate spa in the Conway valley, one mile from Llanrwst station (L. & N.W.Ry.); 5 hours by rail from London. The climate is bracing, the air soft, pure, and mostly of a westerly or south-westerly type; it is recommended for the convalescent and the neurasthenic.

Waters.—Two varieties: (1) The aluminous chalybeate, and (2) the sulpho-magnesian chalybeate; the former contains 4·36 grains per ounce of crystalline ferrous sulphate, and the latter 1·95 grains per ounce of the same salt. Used internally, and externally in the form of baths.

Therapeutic Indications.—All those morbid conditions in which iron is indicated; conditions which, as a rule, mainly depend on some degenerative or destructive changes in the blood. For the so-called 'metabolic' diseases, which chiefly consist in some digestive inefficiency, some incomplete elimination of food-toxins and other various waste products, and

some defective blood-formation. Useful in certain chronic skin diseases e.g., psoriasis, eczema, acne, and impetigo. Also suitable for the anæmia of 'granular kidney,' for some types of chronic catarrhal disease of mucous membranes, and for the usual forms of round-worm and tape-worm. The initial doses are small, usually from 2 or 3 teaspoonfuls to one or two tablespoonfuls gradually increased, being taken from first to last under strict medical supervision.

Tunbridge Wells (Kent).—400 feet above sea level. 1 hour from London (Charing Cross, S.E.C.R.). 30 miles from Hastings. Mean winter temperature 41·3° F., summer 55·9° F. Lies upon a bed of sandstone. Climate is tonic and invigorating. Prevailing winds W. and S.W.

Water.—A weak non-aerated, chalybeate spring, containing 4 grains ferrous carbonate to the gallon, with sulphates and chlorides of potash, soda, and calcium.

Therapeutic indications.—(Climatic) diseases of respiratory organs (bronchitis, asthma, and phthisis), early cardiac cases, diseases of digestive organs, gout and rheumatoid arthritis, and especially diseases of nervous system (neurasthenia and mental depression), also in convalescence and some infantile disorders. Waters indicated in anæmia, chlorosis, and allied conditions.

Baths.—Immersion, douche, needle, Turkish, Russian, vapour and swimming, medicated and electric light.

Nursing.—Mount Ephraim Nursing Home (*See p.* 721).

Woodhall Spa (Lincolnshire) (*See also p.* 732).—Built upon ironstone sand, through which the rain percolates very rapidly. Midway between Boston and Lincoln, about 3 hours from London (King's Cross). Average rainfall, 22½ inches. Air bracing, and uncontaminated, from moors and pine woods. Excellent new water supply.

Waters.—Bromo-iodine waters, rich in the chlorides of sodium, calcium, and magnesium, with bromine and iodine.

Therapeutic indications.—Rheumatism (chronic articular and muscular), lumbago, arthritis deformans, gouty arthritis, sciatica, neuritis, paralysis, neurasthenia; injuries to joints; skin diseases, psoriasis, urticaria; diseases peculiar to women; diseases of throat and nose; liver disorders.

Spa Baths.—Recently enlarged. Immersion, shower, undercurrent and local douches; Aix and Vichy douche massage; Nauheim, electric and Schnee baths; Dowsing radiant heat and light baths; Bergonie treatment; nose, throat and eye mineral sprays and douches; Russian and Berthollet vapour; electric ionic and *x*-ray treatments; massage and Swedish exercises. Particulars, apply Medical Superintendent.

Hotel.—Victoria Hotel (*See p.* 732).

Helouan, Egypt.—Sixteen miles from Cairo by train, 200 feet above the Nile, which is about three miles from the town. Celebrated for its wonderfully dry, warm, and yet bracing climate, the amount of sunshine in the winter months, and its convenient position for seeing many of the antiquities of Egypt. The amount of bright sunshine from November to March averages 8·3 hours a day, as against 1·4 in London. The diurnal variations are small, the air is fresh by day and night and very free from dust. The average annual rainfall is about ¾ of an inch.

Waters.—Strong sulphur waters, which are used internally and externally in various ways, but especially in the Helouan Bath (New Bath Establishment), in which massage is given while a stream of water at the desired temperature passes freely through the bath. This water rises at a temperature of 91° F.

Therapeutic indications.—Gout, rheumatism, the various forms of chronic arthritis, fibrositis and neuritis, neurasthenia, chronic nephritis, and for those requiring a dry, not relaxing, warm climate.

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	St. Thomas's Hospital		
	Tolmers Square Institute, Drummond St., N.W.	J. Loane, M.R.C.P., 13, Great Alie Street, E.	Monday ; 1
	Eastern Disp., Leman St.		Wed. ; 11
	Christ Church Mission Hall, Shroton St., Marylebone	E. C. Greenwood, L.R.C.P., 1, Hanover Hse, St. John's Wood, N.W.	Fri. ; 3 (beginning in Feb. May & Nov
	St. Olave's and St. John's Institute, Tooley St., S.E.	V. A. Jaynes, M.R.C.S., 157, Jamaica Road, Bermondsey, S.E.	Wednesday ; 2 (except August)
	Royal Free Hospital, Gray's Inn Road, W.C.	Mrs. F. E. Willey, M.D., 31, Devonshire Place, W.	*
Birmingham ..	144, Hockley Hill	W. H. Line, M.D., ... 144, Hockley Hill	*
Bristol ..	Royal Infirmary	I. Walker Hall, M.D., .. Linden Gate, Clifton Down Road	*
Cambridge ..	Addenbrooke's Hospital ..	Dr. F. Deighton, ... Hills Road	*
Leeds ..	Leeds General Infirmary ..	Dr. A. T. Bacon, .. Westfield, Hyde Park Rd.	*
Liverpool ..	The School of Hygiene ..	W. Hanna. M.D., ... Port Sanitary Office, Pier Head	
Manchester ..	St. Mary's Hosp., Whitworth Street West	John Scott, M.D., .. 249, Upper Brook Street	*
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Cardiff ..	University College	Dr. E. E Roberts, University College, Old Buildings.	
Aberdeen ..	The Public Dispensary ..	Dr. T. Fraser, .. . 16, Albyn Place	Wednesday ; 3. (during med. sess.
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(*a*.) *Candidates for Certificates should communicate with the authorized Teacher to learn the dates of his or her regular courses of instruction.* * *Days and hours arranged each Session.*

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Abernethian Society—St. Bartholomew's Hospital, E.C.
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Anatomical Society of Great Britain and Ireland—Secretary, John Cameron, M.D., Medical School, Middlesex Hospital, W.
Association for the Advancement of Medicine by Research—Sec., W. Hale White, M.D., 38, Wimpole Street, W.
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Association of Registered Medical Women—Sec., 114a, Harley Street, W.
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British Association for the Advancement of Science—Burlington House, W.
British Dental Association—Secretary, 19, Hanover Square, W.
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British Society for the Study of Orthodontics—Sec., 15, Upper Wimpole Street, W.
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Epileptics, National Society for—Denison House, 296, Vauxhall Bridge Road, S.W.
Epsom College (Royal Medical Foundation)—Sec., 37, Soho Square, W.
Harveian Society of London—Stafford Rooms, Tichborne Street, W.
Hospital Saturday Fund—Sec., 54, Gray's Inn Road, W.C.
Hunterian Society, Hall of Barbers' Co., Monkwell Street, E.C.
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British Medical Journal—Weekly 6d.—429, Strand, W.C.
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Caledonian Medical Journal—Quarterly 1/—70, Mitchell Street, Glasgow.
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Child, The—Monthly 2/—Bale, 83–91, Great Titchfield Street, W.
Children's Diseases, British Journal of—Monthly 2/—Adlard & Son and West Newman, Bartholomew Close, E.C.
Clinical Journal—Monthly 1/3, 15/6 per annum—23, Bartholomew Close, E.C.
Dental Directory—Yearly 3/6—Bale, 83–91, Great Titchfield Street, W.
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Homœopathic Journal, British—Monthly 1/—Bale, 83–91, Great Titchfield Street, W.
Homœopathic World—Monthly 6d.—12, Warwick Lane, E.C.
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Hygiene, Journal of—Occasionally, 7/- each—Fetter Lane, E.C.
Indian Medical Gazette—Monthly 19/- per annum—Thacker & Co., 2, Creed Lane, E.C. (*See Advertisement.*)
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Jennerian (Supplement to the *Medical Officer*)—36–38, Whitefriars Street, E.C.
Laboratory and Clinical Medicine, Journal of—Monthly 1/6; 15/- per annum—Hy. Kimpton, 263, High Holborn, E.C.
Lancet—Weekly 8d.; 30/- per annum—423, Strand, W.C. (*See Advertisement.*)
Laryngology, Rhinology, and Otology, Journal of—Monthly 2/-; 20/- per annum—Adlard & Son and West Newman, Bartholomew Close, E.C. (*See Advertisement.*)
Laryngoscope, The—Monthly 25/- per ann.—Baillière, 8, Henrietta St., W.C.
Liverpool Medico-Chirurgical Journal—Half-yearly, 2/6 each—H. K. Lewis & Co. Lim., 136, Gower Street, W.C.
London Hospital Gazette—6/- per annum—5, Rupert Street, E.
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Medical Chronicle—Monthly 1/6—33, Soho Square, W.
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Medical Magazine—Monthly 1/—44, Bedford Row, W.C.
Medical Officer—Weekly 6d.: 21/- per annum—36–38, Whitefriars Street E.C. (*See Advertisement.*)

Medical Press and Circular—Weekly 5d.; 21/- per annum—Baillière, 8, Henrietta Street, W.C. *(See Advertisement.)*
Medical Register—Yearly 10/6—Constable, 10, Orange Street, W.C.
Medical Review—Monthly 1/6—70, Finsbury Pavement, E.C.
Medical Temperance Review—Quarterly 6d.—Adlard & Son and West Newman, Bartholomew Close, E.C.
Medical Times—Weekly 2d.—49 & 50, Watling Street, E.C.
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Medical and Dental Students' Register—Yearly, 2/6—Constable, 10, Orange Street, W.C.
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Midland Medical Journal—Monthly 4d.—Greswolde House, Birmingham.
Midwives' Roll—Yearly 10/6—Spottiswoode, 5, New Street Square, E.C.
National Dental Hospital Gazette—Monthly from Oct. to March, 3/- per annum—Bale, 83–91, Great Titchfield Street, W.
National Medical Journal—Monthly 3d.—346, Strand, W.C.
Neurology and Psychiatry, Review of—25/- per annum—20, South Frederick Street, Edinburgh.
New York Medical Journal—Weekly 6d.—66, West Broadway, New York.
New York Medical Record—Weekly 6d.—Wm. Wood & Co., 51, Fifth Avenue, New York.
Nurses' Own Magazine and Midwives' Record—Monthly, 2/- per annum—Baillière, 8, Henrietta Street, W.C.
Nursing Mirror and Midwives' Journal—Weekly, 1d.—28, 29, Southampton Street, W.C.
Nursing Notes and Midwives' Chronicle—Monthly 2d.—12, Buckingham Street, Strand, W.C.
Nursing Times—Weekly 1d.—Macmillan & Co. Lim., St. Martin's Street, W.C.
Obstetrics and Gynæcology of the British Empire, Journal of—Monthly 2/6—Sherratt & Hughes, 33, Soho Square, W.
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Ophthalmological Society's Transactions—Yearly 12/6—J. & A. Churchill, 7, Great Marlborough Street, W.
Ophthalmology, British Journal of—Monthly, 31/6 per annum—Pulman and Sons Lim., 24, Thayer Street, W.
Orthodontia, International Journal of—Monthly 1/6; 15/- per annum—Hy. Kimpton, 263, High Holborn, E.C.
Parasitology—Quarterly 30/- per annum—Cambridge University Press, Fetter Lane, E.C.
Pathology and Bacteriology, Journal of—Quarterly 21/- per annum—Pathological Laboratory, Museums, Cambridge.
Pharmaceutical Journal—Weekly 6d.—17, Bloomsbury Square, W.C.
Pharmacology and Experimental Therapeutics, Journal of—six times per annum for 21/-—Cambridge University Press, Fetter Lane, E.C.
Pharmacy, Year Book of—Yearly 10/-—7, Great Marlborough Street, W.
Physiological Abstracts—Monthly 25/- per annum—H. K. Lewis & Co., 136, Gower Street
Physiology (Experimental), Quarterly Journal of 25/- per annum—Chas. Griffin & Co. Lim., Exeter Street, W.C.
Physiology, Journal of—Occasionally, 21/- per volume—Fetter Lane, E.C.
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Practitioner—Monthly 2/6; 25/- per annum—2, Howard Street, Strand, W.C. *(See Advertisement.)*

Prescriber—Monthly 1/–; 10/– per annum—6, South Charlotte Street, Edinburgh.
Proctologist and Gastroenterologist—Quarterly 3/6; 10/– per annum—Hy. Kimpton, 263, High Holborn, E.C.
Psychology, British Journal of—Occasionally 15/—Cambridge University Press, Fetter Lane, E.C.
Psychology (Abnormal), Journal of—Bi-monthly 16/– per annum—Baillière, 8, Henrietta Street, W.C.
Public Health—Monthly 1/8—1, Upper Montague Street, W.C.
Public Health, Journal of the Royal Institute of—Monthly 2/—37, Russell Square, W.C.
Quarterly Journal of Medicine—Quarterly 8/6—Oxford University Press, Amen Corner, E.C.
R.A.M.C., Journal of the—Monthly 2/—Bale, 83–91, Great Titchfield St., W.
Radiology and Electro-Therapy, Archives of—Monthly 2/—W. Heinemann, 20 and 21, Bedford Street, W.C.
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Royal Dental Hospital Reports—Quarterly, 5/– per annum—Bale, 83–91 Great Titchfield Street, W.
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Royal Society of Medicine, Proceedings of the—Monthly, Nov. to July, 7/6 each part—Longmans, Green & Co., 39, Paternoster Row, E.C.
Sanitary Record—Weekly 3d.; 14/– per ann.—55–56, Chancery Lane, W.C.
School Hygiene—Quarterly, 4/6 per ann.—Adlard, Bartholomew Close, E.C.
South African Medical Record—Fortnightly 1/–; 21/– per annum—Baillière, 8, Henrietta Street, W.C.
St. Bartholomew's Hospital Journal—Monthly 6d.—Students' Union, St. Bartholomew's Hospital, E.C.
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State Medicine, Journal of—Monthly, 2/—Bale, 83-91, Gt. Titchfield St., W.
Surgery, British Journal of—Quarterly, 8/6 net; 31/6 per annum—John Wright & Sons Lim., Bristol. (*See advertisement.*)
Surgery, Gynæcology, and Obstetrics, and International Abstract of Surgery—Monthly, 5/–; 50/– per annum—Baillière, 8, Henrietta Street, W.C.
Tropical Diseases Bulletin—Fortnightly 1/6—Baillière, 8, Henrietta St., W.C.
Tropical Life—Monthly 1/—Bale, 83–91, Great Titchfield Street, W.
Tropical Medicine and Hygiene, Journal of—Fortnightly 1/–; 18/– per annum—Bale, 83–91, Great Titchfield Street, W.
Tropical Medicine and Hygiene, Transactions of the Society of—Eight numbers yearly, 3/6 net each—H. K. Lewis & Co. Lim., 136, Gower Street, W.C.
Tropical Medicine and Hygiene, Year Book of—Yearly 7/6—Bale, 83–91, Great Titchfield Street, W.
Tropical Medicine and Parasitology, Annals of—Quarterly, 22/6 per annum—University Press, 57, Ashton Street, Liverpool.
Tuberculosis, British Journal of—Quarterly 1/6—Baillière, 8, Henrietta Street, W.C. (*See advertisement.*)
Tuberculosis Year Book and Sanatoria Annual—Yearly 7/6—Bale, 83–91, Great Titchfield Street, W.
Universal Medical Record—Monthly, 25/– per annum—36–38, Whitefriars Street, E.C.
University College Hospital Magazine—Six times during the year, 1/—Bale, 83–91, Great Titchfield Street, W.
West London Medical Journal—Quarterly 1/—23, Bartholomew Close, E.C.

SELECTED MEDICAL TRADES DIRECTORY.

Ambulances.

Austin Motor Co. (1914) Lim., Longbridge Works, Northfield, Birmingham.

Artificial Eyes.

Grossmith, W. R., 110, Strand, W.C. 1.
Pache & Son, 75, Station Street, Birmingham

Artificial Limbs.

Anderson & Whitelaw, Lim., Broad Street Corner, Birmingham.
Critchley, J. & Sons, 18, Great George Street, Liverpool
Ferris, J. & E., 33, Museum Street, W.C. 1
Braid, A. E. & Co. Lim., 30, Gower Place, Gower Street, W.C. 1.
Gray & Selby, Pelham Street, Nottingham.
Grossmith, W. R., 110, Strand, W.C. 1.
Haywood, J. H. Lim., Castle Gate, Nottingham.

Bandage and Antiseptic Dressing Manufacturers.

Braid, A. E. & Co. Lim., 30, Gower Place, Gower Street, W.C. 1
Liverpool Lint Co., Netherfield Road North, Liverpool

Dietetic Articles (Manufacturers of).

Allen & Hanburys Lim., Lombard Street, E.C. 3
Brand & Co. Lim., Mayfair Works, Vauxhall, S.W.
Brown, Gore & Co., Tower House, 40, Trinity Sq., E.C. 3 (Gautier Frères' Brandy)
Burrow, W. & J., The Springs, Malvern (Waters)
Cadbury Bros. Lim., Bournville, Birmingham
Callard & Co., 74, Regent Street, W. 1 (Diabetic Foods)
Camwal Lim., 112, Pembroke Street, N. (Waters)
Casein Lim., Culvert Works, Battersea, S.W.
Fry, J. S. & Sons Lim., Bristol & London
Liebig's Extract of Meat Co., Lim., Thames House, E.C. 4
Maltine Manufacturing Co., Lim., 183, Acton Vale, W.
Rattray, A. Dewar, 188, Dumbarton Road, Partick, Glasgow (Wines and Spirits)
Therapeutic Foods Co. Lim., Covent Garden, W.C. 2
Valentine's Meat-Juice Co., Richmond, Virginia, U.S.A.
Wander, A. Lim., 45, Cowcross Street, E.C. 1
Watford Mfg. Co., Victoria Works, Watford.
Wells, J. O., 1, Manor Rd., Brockley, S.E. 4 (Diabetic Gluten Breads)

Druggists (Principal Wholesale).

Allen & Hanburys Lim., 37, Lombard Street, E.C. 3
Alliance Drug & Chemical Co., 34, Leadenhall Street, E.C. 3
Anglo-French Drug Co. Lim. (late Bresillon, M. & Co.), Gamage Buildings, Holborn, E.C. 1
Bishop, Alfred, Lim., 48, Spelman Street, N.E.
Boots Pure Drug Co. Lim., Nottingham
Bristol-Myers Co., 277–281, Greene Avenue, Brooklyn, New York
Burroughs Wellcome & Co., Snow Hill Buildings, E.C. 1
Christy, Thos. & Co., 4, 10, & 12, Old Swan Lane, E.C. 4
Denver Chemical Mfg. Co., 41, St. Ann's Road, Bow, London, E. 3
Duncan, Flockhart & Co., 143, Farringdon Rd., E.C. 1, & Edinburgh
Evans Sons Lescher & Webb Lim., 60, Bartholomew Close, E.C. 1, and 56, Hanover St., Liverpool
Fellows Company of New York, 26, Christopher Street, New York.
Ferris & Co. Lim., Bristol
Fletcher, Fletcher & Co. Lim., Thane Road, Holloway, N.
Gale & Co. Lim., 15, Bouverie Street, E.C. 1
Giles, Schacht & Co. Clifton, Bristol
Guyot-Guenin & Son, 67, Southwark Bridge Road, S.E. 1
Harris (Philip) & Co. Lim., Edmund Street, Birmingham
Heppells, 164, Piccadilly, W. 1.
Hewlett, C. J. & Son Lim., 35–42, Charlotte Street, E.C. 2
Hoffmann-La Roche Chemical Works Lim., 7 and 8, Idol Lane, E.C. 3
Hough, Hoseason & Co., Bridge St., Manchester
Howards & Sons Lim., Ilford, N.E.
Martindale, W., 10, New Cavendish Street, W. 1

Matthews, Harold E. & Co., 30, The Mall, Clifton, Bristol
Maw, S., Son & Sons, 7–12, Aldersgate Street, E.C.1
May & Baker, Lim., Battersea, S.W.
May, Roberts & Co. Lim., 7—13, Clerkenwell Road, E.C.1
Menley & James Lim., Menley House, Farringdon Road, E.C.1
Midgley, Chas., Lim., 4, Exchange Street, Manchester
Newbery, F. & Sons Lim., Charterhouse Square, E.C.1
Oppenheimer, Son & Co., Lim., 179, Queen Victoria Street, E.C.4
Parke, Davis & Co., Beak Street, Regent Street, W.1
Peat Products (Sphagnol) Lim., 18, Queenhithe, Upper Thames St., E.C.4
Phillips (Chas. H.) Chemical Co., 14, Henrietta Street, W.C.2
Quibell Bros. Lim., Newark.
Reynolds & Branson Lim., 13, Briggate, Leeds
Roberts & Co., 76, New Bond Street, W.1
Rogers, F. A., 327, Oxford St., W.1
S. P. Charges Co., St. Helens, Lancs.
Savory & Moore Lim., 143, New Bond Street, W.1
Southall Bros. & Barclay Lim., Birmingham
Squire & Sons Lim., 413, Oxford Street, W.1
Sumner, R. & Co. Lim., 40, Hanover Street, Liverpool
Symes & Co. Lim., Liverpool
Wander, A., Lim., 45, Cowcross Street, E.C.1
Whiffen & Sons Ltd., Battersea, S.W.
Willows, Francis, Butler & Thompson Lim., 40, Aldersgate St., E.C.1
Woolley, Jas., Sons & Co. Lim., Victoria Bridge, Manchester
Wyleys Lim., Coventry
Zimmermann, Chas. & Co. (Chemicals), Lim., 9 & 10, St. Mary-at-Hill, E.C.3

Electro-Medical, X-Ray, and Scientific Instrument Makers.

Baker, C., 244, High Holborn, W.C.1 (Microscopes)
Bausch & Lomb Optical Co., 37 and 38, Hatton Garden, E.C.1
Butt, Fredk. R., & Co. Lim., 147, Wardour Street, W.1
Cavendish Electrical Co. Ltd., 105–107, Great Portland Street, W.1
Cox, Harry W. & Co. Lim., 159-161, Great Portland Street, W.1
Dean, Alfred E., Leigh Place, Brooke Street, Holborn, E.C.1
Elliott & Sons Lim., Barnet, Herts. (X-Ray Plates).
Hearson, Chas. & Co. Lim., 235, Regent St., W.1 (Incubators).
Kodak Ltd. (Wratten Divis.), Kodak House, Kingsway, W.C.2 (X-Ray Plates)
Medical Supply Association, 167–185, Gray's Inn Road, W.C.1
Mottershead & Co., 7, Exchange St., Manchester
Newton & Wright Lim., 72, Wigmore Street, W.1
Schall & Schall, 71 and 75, New Cavendish Street, W.1
Siemens Bros. & Co. Lim., 38 & 39, Upper Thames Street, E.C.4
Watson & Sons (Electro-Medical) Lim., 196, Gt. Portland St., W.1

Opticians.

Bausch & Lomb Optical Co., 37 and 38, Hatton Garden, E.C.1
Bruce, Green & Co. Lim., 14–18, Bloomsbury Street, W.C.1
Davidson, F. & Co., 29, Great Portland Street, W.1
Lizars, J., 171, Union Street, Aberdeen.
Newton & Wright Lim., 72, Wigmore Street, W.1

Opticians (Dispensing).

Hamblin Lim., 5, Wigmore Street, and 50, New Cavendish Street, W.1; 9, Peter St., Manchester; 296, Glossop Road, and 38, Infirmary Road, Sheffield.

Printers (Medical).

Cassell & Co. Lim. Ludgate Hill, E.C.
Wright, John & Sons Lim., Bristol

Publishers and Booksellers (Medical).

Adlard & Son and West Newman, Bartholomew Close, E.C.1
Appleton, D. & Co. 25 Bedford Street, Covent Garden, W.C.2
Arnold, Edward, 41 & 43, Maddox Street, W.1
Baillière, Tindall & Cox, 8, Henrietta Street, W.C.2
Bale, John Sons & Danielsson Lim., 83–91, Great Titchfield St., W.1
Black, A. & C., Lim., Soho Sq., W.1
Butterworth & Co., Bell Yard, Temple Bar, W.C.2

Cambridge University Press (C. F. Clay), Fetter Lane, E.C.4
Cassell & Co. Lim., La Belle Sauvage, Ludgate Hill, E.C.4 (and Printers)
Churchill, J. & A., 7, Great Marlborough Street, W.1
Constable & Co. Lim., 10, Orange Street, W.C.2
Cornish Bros. Lim., 39, New Street, Birmingham
Fannin & Co. Lim., Grafton Street, Dublin
Glaisher, Henry J., 55 and 57, Wigmore Street, W.1
Green, W. & Son Lim., St. Giles Street, Edinburgh
Griffin, Chas. & Co. Lim., 12, Exeter Street, Strand, W.C.2
Heinemann, William, 21, Bedford Street, W.C.2
Hilton & Co., 109, College Street, Calcutta, India
Jack, T. C. & E. C., Causewayside, Edinburgh.
Kimpton, Henry (Hirschfeld Bros. Lim.), 263, High Holborn, W.C.1
Lewis, H. K. & Co. Lim., 136, Gower Street, W.C.1
Lippincott, J. B. Co., 16, John Street, Adelphi, W.C.2
Livingstone, E. & S., Teviot Place, Edinburgh
Longmans, Green & Co., 39, Paternoster Row, E.C.4
Maclehose, J. & Sons, 61, St. Vincent Street, Glasgow
Macmillan & Co. Lim., St. Martin's Street, W.C.2
Medical Publishing Co. Lim., 23, Bartholomew Close, E.C.1
Methuen & Co. Lim., 36, Essex Street, W.C.2
Murray, John, Albemarle Street, W.1
Nisbet, Jas. & Co. Lim., 22, Berners Street, W.1
Oliver & Boyd, Tweeddale Court, Edinburgh
Oxford Medical Publications (Henry Frowde and Hodder & Stoughton), Falcon Square, E.C.1
Oxford University Press (Humphrey Milford), Amen Corner, E.C.
Pulman, Geo. & Sons Lim., Thayer Street, W.
Saunders, W. B. Co., 9, Henrietta Street, W.C.2
Scientific Press Lim., 28 and 29, Southampton Street, W.C.2
Sherratt & Hughes, University Press, 34, Cross Street, Manchester
Simpkin, Marshall, Hamilton, Kent & Co. Lim., Stationers' Hall Court and Paternoster Row, E.C.4
Smith, Elder & Co., 15, Waterloo Place, S.W.1
Thacker, W. & Co., 2, Creed Lane, E.C.4 (Thacker, Spink & Co., Calcutta)
University of London Press Lim., Warwick Square, E.C.4
Wright, John & Sons Lim., Bristol (and Printers); London Depot, Stationers' Hall Court, E.C.4

Revolving Shelters.

Hobson, J. T. & Co., Bedford.

Surgical Instrument and Appliance Manufacturers.

Alexander & Fowler, 104 and 106, Pembroke Place, Liverpool
Allen & Hanburys Lim., 48, Wigmore Street, W.1
Anderson & Whitelaw Lim., Broad Street Corner, Birmingham
Arnold & Sons, Giltspur Street, E.C.1
Bailey, W. H. & Son, 38, Oxford Street, W.1
Barth, Geo. & Co., 54, Poland Street Oxford Street, W.1 (Inhalers).
Braid, A. E. & Co. Lim., 30, Gower Place, Gower Street, W.C.1
Clarke, John & Co. (Successors) Lim., 8, Donegall Square West, Belfast
Coles, William & Co., 5, Sackville St., Piccadilly, W.1 (Trusses)
Critchley, J. & Sons, 18, Great George Street, Liverpool
Dental Manufacturing Co. Lim., Alston House, Newman Street, W.1
Domen Belts Co. Lim., 456, Strand, W.C.2
Down Bros. Lim., 21 & 23, St. Thomas's Street, S.E.1
Fannin & Co. Lim., Grafton Street, Dublin
Ferris & Co. Lim., Bristol
Freeman, John, 6, St. Ann's Terrace, Circus Road, Regent's Park N.W.8 (Orthopædic Boot and Shoe Maker)
Gardner, J. & Son, 32, Forrest Road, Edinburgh
Gray & Selby, Pelham Street, Nottingham.
Grossmith, W. R., 110, Strand, W.C.1
Harris (Philip) & Co. Lim. Edmund Street, Birmingham

Hawksley & Sons, 357, Oxford Street, W.1
Haywood, J. H. Lim., Castle Gate, Nottingham
Hearson, Chas. & Co. Lim., 235, Regent Street, W.1 (Incubators)
Holborn Surgical Instrument Co. Lim., 26, Thavies Inn, E.C.1
Holden Bros., 3, Harewood Place, Oxford Street, W.1 (Footwear)
Holland & Son, 46, South Audley Street, W.1 (Foot Supports)
Hospitals & General Contracts Co. Lim., 25–35, Mortimer St., W.1
Matthews Bros., 10, New Oxford Street, W.C.1
Maw, S., Son & Sons, 7 to 12, Aldersgate Street, E.C.1
Mayer & Meltzer, 71, Great Portland Street, W.1
Medical Supply Association, 167–185, Gray's Inn Road, W.C.1
Millikin & Lawley, 165, Strand, W.C.2
Montague, J. H., 69, New Bond Street, W.1
Mottershead & Co., 7, Exchange St., Manchester
Pache & Son, 75, Station Street, Birmingham (Artificial Eyes)
Patent Pulp Mfg. Co. Lim., 38, York Road, King's Cross, N.1 ("Red Cross" Bowls and Basins).
Reynolds & Branson Lim., 13, Briggate, Leeds
Rogers, Frank A., 327, Oxford Street, W.1
Salmon Ody Lim., 7, New Oxford Street, W.C.1 (Trusses)
Salt & Son Lim., 5, Cherry Street, Birmingham
Schaerer, M., 41, Berners St., W.1
Skellington, A., 49, Clundi Rd., Blackheath, S.E.3 (Invalid Lifters)
Sumner, R. & Co. Lim., 40, Hanover Street, Liverpool
Surgical Manufacturing Co., 85, Mortimer Street, W.1
Thackray, Chas. F., 66–70, Great George Street, Leeds
Weiss, John & Son Lim., 287, Oxford Street, W.1
White & Wright, 93, Renshaw Street, Liverpool
Woolley, Jas. Sons & Co. Lim., Victoria Bridge, Manchester
Young (Archibald) & Son, 57–61, Forrest Road, Edinburgh

Thermometer Manufacturers.

Zeal, G. H., 82, Turnmill Street, E.C.1

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The Hammond Typewriter Co. Lim., 75, Queen Victoria Street, E.C.4

Vaccine Lymph.

Government Lymph Establishment, Colindale Avenue, The Hyde, N.W.9. Lymph is supplied, free of charge, to Public Vaccinators, on application to the Clerk

NOTE BOOK.

It is easier to make a note of a thing than to remember *where* the note was made. The following pages are indexed under their respective headings, and any note can be immediately found when required.

1917

JANUARY.						
S	*	7	14	21	28	
M	1	8	15	22	29	
Tu	2	9	16	23	30	
W	3	10	17	24	31	
Th	4	11	18	25	*	
F	5	12	19	26	*	
S	6	13	20	27	*	

NOTES.

Copy here any formula or fact you wish to keep for reference.

(These pages are indexed under the word "Notes.")

1917

FEBRUARY.						
S	*	4	11	18	25	
M	*	5	12	19	26	
Tu	*	6	13	20	27	
W	*	7	14	21	28	
Th	1	8	15	22	*	
F	2	9	16	23	*	
S	*	10	17	24	*	

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See Advertisement, page xxv. *Signed*... ... ... M.D.

1917

MARCH.						
S	*	4	11	18	25	
M	*	5	12	19	26	
Tu	*	6	13	20	27	
W	*	7	14	21	28	
Th	1	8	15	22	29	
F	2	9	16	23	30	
S	*	10	17	24	31	

NOTES.

1917

APRIL.						
S	1	8	15	22	29	
M	2	9	16	23	30	
Tu	3	10	17	24	*	
W	4	11	18	25	*	
Th	5	12	19	26	*	
F	6	13	20	27	*	
S	7	14	21	28	*	

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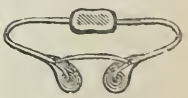

1917

MAY.						
S	*	6	13	20	27	
M	*	7	14	21	28	
Tu	1	8	15	22	29	
W	2	9	16	23	30	
Th	3	10	17	24	31	
F	4	11	18	25	*	
S	5	12	19	26	*	

NOTES.

1917

JUNE.						
S	*	3	10	17	24	*
M	*	4	11	18	25	*
Tu	*	5	12	19	26	*
W	*	6	13	20	27	*
Th	*	7	14	21	28	*
F	1	8	15	22	29	*
S	2	9	16	23	30	*

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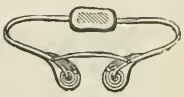

1917

JULY.						
S	*	1	8	15	22	29
M	*	2	9	16	23	30
Tu	*	3	10	17	24	31
W	*	4	11	18	25	*
Th	*	5	12	19	26	*
F	*	6	13	20	27	*
S	*	7	14	21	28	*

NOTES.

1917

AUGUST.						
S	*	5	12	19	26	
M	*	6	13	20	27	
Tu	*	7	14	21	28	
W	1	8	15	22	29	
Th	2	9	16	23	30	
F	3	10	17	24	31	
S	4	11	18	25	*	

GERMAN WINES !!

Were recommended by the Medical Profession before the War.

TOURAINE & ANJOU WINES from the Garden of FRANCE

See Advertisement, page 785. **Effectively Replace them.**

1917

SEPTEMBER.						
S	*	2	9	16	23	30
M	*	3	10	17	24	*
Tu	*	4	11	18	25	*
W	*	5	12	19	26	*
Th	*	6	13	20	27	*
F	*	7	14	21	28	*
S	1	8	15	22	29	*

NOTES.

1917

OCTOBER.						
S	*	7	14	21	28	
M	1	8	15	22	29	
Tu	2	9	16	23	30	
W	3	10	17	24	31	
Th	4	11	18	25	*	
F	5	12	19	26	*	
S	6	13	20	27	*	

GAUTIER FRÈRES' *ESTABLISHED* 1755.
FINE LIQUEUR BRANDY.
(20 *YEARS OLD.*) *See Advertisement, page lxviii.*

1917

NOVEMBER.						
S		4	11	18	25	
M		5	12	19	26	
Tu		6	13	20	27	
W		7	14	21	28	
Th	1	8	15	22	29	
F	2	9	16	23	30	
S	3	10	17	24		

NOTES.

1917

DECEMBER.						
S		2	9	16	23	30
M		3	10	17	24	31
Tu		4	11	18	25	
W		5	12	19	26	
Th		6	13	20	27	
F		7	14	21	28	
S	1	8	15	22	29	

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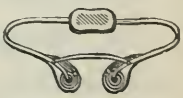

1918

JANUARY.						
S	*	6	13	20	27	
M	*	7	14	21	28	
Tu	1	8	15	22	29	
W	2	9	16	23	30	
Th	3	10	17	24	31	
F	4	11	18	25	*	
S	5	12	19	26	*	

NURSES.

Note whether Midwifery or Sick Nurses, their terms and addresses.

1918

FEBRUARY.						
S	*	3	10	17	24	*
M	*	4	11	18	25	*
Tu	*	5	12	19	26	*
W	*	6	13	20	27	*
Th	*	7	14	21	28	*
F	1	8	15	22	*	*
S	2	9	16	23	*	*

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LATE 225, PICCADILLY, W.) *Particulars by post.*

1918

MARCH.						
S	*	3	10	17	24	31
M	*	4	11	18	25	*
Tu	*	5	12	19	26	*
W	*	6	13	20	27	*
Th	*	7	14	21	28	*
F	1	8	15	22	29	*
S	2	9	16	23	30	*

ADDRESSES (PRIVATE).

1918

APRIL.						
S	*	7	14	21	28	
M	1	8	15	22	29	
Tu	2	9	16	23	30	
W	3	10	17	24	*	
Th	4	11	18	25	*	
F	5	12	19	26	*	
S	6	13	20	27	*	

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An Elegant and Effective Preparation for GASTRO-INTESTINAL DISTURBANCE COMPLICATED WITH VOMITING.

See full announcement on page lvi.

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A, *when Established;* B, C, D, *Annual Premiums to Insure £*100 *on death, with Profits, at the age of* 30, 40, *and* 50; E, *Assurance and Annuity Funds, exclusive of Paid-up Capital.*
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Title, Etc., of Office.	A	B	C	D	E
					£
Abstainers and General Insurance Co., Ltd., Edmund St., Birmingham. *Gen. Manager,* H. J. Greening .. .. P	1883	40/11	55/10	82/3	1,000 000
Alliance Assurance Co. Ltd., Bartholomew Lane, E.C. *Gen. Man.,* Robert Lewis P	1824	48/9	64/5	90/9	8,185,903
Atlas Assurance Co. Ltd., 92, Cheapside, E.C. *Gen. Man.* Saml. J. Pipkin. *Act.,* William Peuman .. .. .. P	1808	49/3	63/7	88/8	2,279,946
Australian Mutual Provident Society. Life, Endowments and Annuities, 37, Threadneedle Street, E.C. *Res. Sec.,* A. C. Hollingworth. Further particulars see page 671 .. .. .. M	1849	48/2	64/5	89/10	*34,000,000
Britannic Assurance Co. Ltd., Life, Endowment Assurances, House Purchase, Broad Street Corner, Birmingham. *Chairman,* F. T. Jefferson, J.P. *Secretary,* J. A. Jefferson, F.I.A. Further particulars see page 670 .. .. P	1866	47 9	64/–	91/1	3,960,598
British Equitable Assurance Co. Ltd., 1, 2, 3, Queen Street Place, E.C. *Manager,* Basil May, F.I.A. .. .. .. P	1854	48/8	64/11	91/9	1,634 000
Caledonian Insurance Co., 19, George Street, Edinburgh. *Gen. Man.,* Robert Chapman. London Offices, 82, King William Street, E.C., and 14, Waterloo Place, S.W. P	1805	48/9	64/6	88/6	3,576,733
Canada Life Assurance Co., 15, King Street, Cheapside, E.C. *Man.,* A. D. Cheyne P	1847	48/5	65/4	94/2	11,115,125
Century Insurance Co. Ltd., 18, Charlotte Sq., Edinburgh. *Gen. Man.,* Hy. Brown. *Sec.,* John R. Little. London Office, 27, Queen Victoria St., E.C. *Man.,* S. G. Pasfield	1885	50/–	65/4	91/–	893,129
City Life Assurance Co. Ltd., 6, Paul Street, Finsbury, E.C. *Gen. Man.,* M. Gregory	1897	44/1	60/11	89/7	*457,743
Clergy Mutual Assurance Society, Life, 2 & 3, Sanctuary, Westminster. *Act. and Man.,* F. B. Wyatt. *Sec.,* F. T. M. Byers. Further particulars see page 669 M	1829	46/4	62/2	87/4	4,338,603
Clerical, Medical, and General Life Assurance Society, 15, St. James's Square, S.W., and 1, King William Street, E.C. *Gen. Man. & Act.,* A. D. Besant .. .. P	1824	48/7	66/6	95/6	*6,223,406
Colonial Mutual Life Assurance Society Ltd., 33, Poultry, E.C. *Man.,* Arthur E. Gibbs. *Assist. Man.,* E. A. Cawdron M	1873	47/4	63/2	89/9	4,250,000
Commercial Union Assurance Co. Ltd., 24, 25, and 26, Cornhill, E.C. *Act.,* A. G. Allen P	1861	47/10	65/2	92/4	6,600, 00
Co-operative Insurance Society Ltd., 109, Corporation Street, Manchester. *Man.,* James Odgers. Further particulars see page 672 .. .. .. P	1867	47/4	63/1	90/1	597,167
Eagle Insurance Co., 79, Pall Mall, S.W. *Man. & Act.,* F. B. Galer, B.A., F.I.A. *Sec.,* J. F. E. Hall .. .. P	1807	48/7	64/5	89/10	*2,058,124
Edinburgh Life Assurance Co., 26, George Street, Edinburgh. *Man.,* T. M. Gardiner. *Sec. & Act.,* A. E. Sprague, D.Sc., F.F.A., F.I.A. London, 3, Birchin Lane, E.C. *Sec.,* J. J. Bisgood .. .. .. P	1823	47/11	64/2	90/2	4,239,040
English and Scottish Law Life Assurance Association, 33, St. James's Square, S.W. *Gen. Man.,* Albert G. Scott. *Act. & Sec.,* John Spencer, F.I.A. .. .. P	1839	47/1	62/8	87/9	2,942,661

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Equitable Life Assurance Society, Mansion House Street, E.C. *Act. & Man.*, W. P. Elderton. .. .. .. M	1762	53/5	67/11	90/7	5,042,489
Equity and Law Life Assurance Society, 18, Lincoln's Inn Fields, W.C. *Act. & Sec.*, W. P. Phelps, M.A., F.I.A. .. P	1844	48/10	64/6	90/9	4,902 508
Friends' Provident Institution, Bradford, Yorkshire. *Gen. Man. & Sec.*, Henry J. Tapscott *Act.*, Alfd. Moorhouse, F.I.A. M	1832	48/-	64/-	89/7	3,478,304
General Accident Fire and Life Assurance Corporation Ltd., Perth, Scotland. *Gen. Man.*, F. Norie-Miller, J.P. .. P	1885	49/2	64/11	91/3	191.072
General Life Assurance Co., 103, Cannon Street, E.C. *Man. & Sec.*, John Robert Freeman. Further particulars see page 670 .. .. P	1837	49/10	65/4	92/8	2,038,149
Gresham Life Assurance Society Ltd., St. Mildred's House, E.C. *Man. & Sec.*, Alexander Lawson. .. .. P	1848	47/6	62/10	88/6	9,883,157
Guardian Assurance Co. Ltd., 11, Lombard Street, and 21, Fleet St., E.C. *Gen. Man.*, Geo. W. Reynolds. *Act.*, Ernest Woods P	1821	48/10	64/6	89/3	4,434.333
Law Union and Rock Insurance Co. Ltd., Old Serjeants Inn, Chancery Lane. *Gen. Man.*, R. Stirling. .. .. P	1806	48/4	64/-	89/10	*8,187,871
Legal & General Life Assurance Society, 10, Fleet St., E.C. *Act. & Man.*, E. Colquhoun P	1836	50/9	65/11	90/9	10,363,465
Life Association of Scotland, 82, Princes St., Edinburgh. *Man.*, Gordon Douglas. *Sec.* R. M. M. Roddick. London Office, 28, Bishopsgate, E.C. *Sec.*, J. C. Wardrop P	1838	48/11	64/10	91/1	5,697,862
Liverpool and London and Globe Insurance Co. Ltd., 1, Dale Street, Liverpool. *Gen. Man. & Sec.*, A. G Dent. London Office, 1, Cornhill, E.C. .. .. P	1836	49/10	65/9	91/3	4,888 186
London and Lancashire Life and General Assurance Association Ltd., 66, 67, Cornhill, E.C. *Gen. Man.*, W. Æneas Mackay. *Sec.*, Louis I. Jarvis. *Jnt. Asst. Secs.*, E. E. Dent and L. C. Kestin. *Act.*, Harold Dongharty P	1862	48/9	64/9	91/2	3.949,438
London Assurance Corporation, 7, Royal Exchange, E.C. *Man.* of Life Dept., James Clunes. *Act.*, A. G. Hemming .. P	1720	49/-	64/8	90/2	2,683,516
London Life Association, Ltd., 81, King William Street, E.C. *Act. & Man.*, H. M. Trouncer, M.A., F.I.A. .. M	1806	47/-	61/8	85/4	5,517,813
Marine and General Mutual Life Assurance Society, 14, Leadenhall Street, E.C. *Act. & Sec.*, S. Day, F.I.A. .. M	1852	48/10	65/-	91/6	2,117,600
Metropolitan Life Assurance Society, 13, Moorgate Street, E.C. *Sec.*, Bernard Woods. *Act.*, H. J. Baker, F.I.A. .. M	1835	49/9	66/4	92/-	2,336,373
Mutual Life and Citizens' Assurance Co. Ltd. (of Australia), Effingham Ho., 1, Arundel St. W.C. *Sec.*, Alex. S. Sellar, M.A., F.F.A. P	1886	48/9	65/3	89/9	9,680,523
Mutual Life Insurance Co. of New York, 7 & 8, Norfolk Street, Strand, W.C. *Gen. Man.*, J. H. Harrison Hogge. *Sec.*, T. Crawford M	1843	48/9	66/-	97/-	124,658,077
National Benefit Life and Property Assurance Co. Ltd, National House, Newgate Street, E.C. *Man.*, J. Francis, J.P., F.S.S. *Sec.*, S. F. Gaudell .. .. .. P	1890	48/1	64/8	91/4	7,771
National Mutual Life Assurance Society, 39, King Street, Cheapside, E.C. *Act. & Man.*, Geoffrey Marks, F.I.A. *Sec.*, H. J. Lockwood. *Asst. Act.*, E. W. Townley, F.I.A. M	1830	48/4	63/7	89/6	2,933 947
National Mutual Life Association of Australasia Ltd., 5, Cheapside, E.C. *Man.*, H. W Meyers.	1869	46/8	61/6	87/2	9.397 730

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National Provident Institution, 48, Gracechurch Street, E.C. *Act. & Sec.*, L. F. Hovil .. .. .. M	1835	50/2	66/3	91/1	7,443,785
New York Life Insurance Co., Trafalgar Buildings, Trafalgar Square, London, W.C. *Gen. Man.*, E. H. Krause. *Sec.*, Wm. R. Collinson, F.C.I.S. .. .. M	1845	48/9	66/–	96/11	169,098,500
North British and Mercantile Insurance Co., 61, Threadneedle St., E.C., and 64, Princes St., Edinburgh. *Life Man.*, London, D. C. Haldeman. *Fire Man.*, London, A Worley. *Man.*, Edinburgh, Owen D. Jones P	1809	49/10	66/1	91/11	*16,689,490
Northern Assurance Co. Ltd, 1, Moorgate Street, E.C. *Gen. Man.*, H. E. Wilson P	1836	49/–	64/8	90/10	4,970,544
Norwich Union Life Insurance Society, Norwich. *Gen. Man. & Act.*, Davidson Walker. London Office, 40, Fleet Street, E.C.	1808	45/8	59/6	85/3	14,255,762
Pearl Assurance Co. Ltd., High Holborn, W.C. *Man'g Director*, G. Shrubsall, J.P. P	1864	49/–	65/–	92/–	9,767,871
Phœnix Assurance Co. Ltd., Phœnix House, King William St., E.C., Trafalgar House, Waterloo Place, S.W., and 187, Fleet Street, E.C. *Gen. Man.*, Sir Gerald H. Ryan, F.I.A. .. .. P	1782	48/11	64/7	90/8	11,252,533
Provident Clerks & General Mutual Life Assurance Association, 27 & 29, Moorgate Street, E.C. *Act. & Sec.*, C. R. V. Coutts .. .. .. M	1840	46/4	62/8	92/2	2,901,665
Prudential Assurance Co. Ltd, Holborn Bars. *Sec.*, G. E. May. Further particulars see page 671 .. P	1848	49/6	65/11	91/11	48,083,780
Refuge Assurance Co. Ltd., Oxford Street, Manchester. *Gen. Mans.*, J. Proctor Green and W. H. Aldcroft. London Office, 133, Strand, W.C. .. .. .. P	1864	49/3	65/9	91/9	11,940,887
Royal Exchange Assurance Corporation, Royal Exchange, E.C., and 44, Pall Mall, S.W. *Act.*, H. E. Nightingale, F.I.A. P	1720	49/–	64/9	90/2	4,676,096
Royal Insurance Co. Ltd., 1, North John St., Liverpool. *Man.*, G. Chappell. London Offices, 24–28, Lombard Street. *Sec.* to London Board, R. M'Connell .. P	1845	48/8	64/4	90/4	11,577,038
Sceptre Life Association Ltd., 40, Finsbury Pavement, E.C. *Sec.*, W. E. Wright P	1864	48/8	64/8	90/6	1,241,656
Scottish Amicable Life Assurance Society, St. Vincent Place, Glasgow. *Man.*, W. Hutton. *Sec.*, C. Guthrie. London Office, 1, Threadneedle St., E.C *Sec.* H. Robertson M	1826	51/9	66/3	90/1	5,918,190
Scottish Equitable Life Assurance Society, 28, St. Andrew Square, Edinburgh. *Man. & Act.*, G. M. Low. *Sec.*, J. J. McLauchlan. London Office, 13, Cornhill, E.C. *Sec.*, P. W. Purves. .. .. M	1831	50/–	65/5	90/6	6,333,307
Scottish Life Assurance Co. Ltd., 19, St. Andrew Square, Edinburgh. *Man.*, Sir David Paulin, F.R.S.E. London Office, 9 & 10, King St., E.C. *Sec.*, L. Campbell P	1881	49/5	64/6	90/5	2,150,605
Scottish Provident Institution, 6, St. Andrew Square, Edinburgh. *Man.*, J. G. Watson. *Sec.*, R. T. Boothby. *Joint Asst. Secs.*, C. W. Thomson & Jas. C. Lindsay. *Act.*, W. G. Walton. London Offices, 3, Lombard St. E.C., and 17, Pall Mall, S.W. .. M	1837	42/4	56/6	83/2	16,138,399
Scottish Temperance Life & Accident Insurance Co., Ltd., 109, St. Vincent Street, Glasgow. *Manager*, Adam K. Rodger. London, 2, 3 & 4, Cheapside. *Man.*, W. A. Bowie. *Less 10 per cent to Whole Life Abstainers* .. .. .. P	1883	48/6	63/9	89/10	2,365,278

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Scottish Union & National Insurance Co.. 35, St. Andrew Square, Edinburgh. *Gen. Man.*, J. A. Cook. London Office, 5, Walbrook, E.C. *Sec.*, James G. Nicoll .. P	1824	48/9	64/6	89/6	8,329,866
Scottish Widows' Fund Life Assurance Society, 9, St. Andrew Square, Edinburgh. *Man. & Act.*, G. J. Lidstone. *Sec.*, Geo. C. Stenhouse. London Offices, 28, Cornhill, E.C., and 17, Waterloo Place, S.W. M	1815	51/9	66/3	90/7	22,284,474
Standard Life Assurance Co., 3, George Street, Edinburgh. *Man.*, Leonard W. Dickson. London Offices, 83, King William St., *Sec.*, C. E. Fox, and 3, Pall Mall East., *Sec.*, F. M. Willats .. .. P	1825	48/11	64/5	89/–	13,575,000
Star Assurance Society, 32, Moorgate Street, E.C. *Gen. Man.*, J. Douglas Watson. P	1843	49/9	66/3	93/8	7,029,216
Sun Life Assurance Society, 63, Threadneedle Street, E.C. *Act.*, R. G. Salmon, F.I.A. *Sec. & Gen. Man.*, E. Linnell P	1810	49/2	66/6	91/2	11,349,335
Sun Life Assurance Co. of Canada, Canada House, 4 & 5, Norfolk Street, W.C. *Man.*, J. F. Junkin .. .. .. P	1865	48/6	65/4	94/1	15,019,395
United Kingdom Provident Institution, 196, Strand, W.C. *Sec.*, H. W. Hasler M	1840	49/6	65/–	91/10	9,755,158
University Life Assurance Society, 25, Pall Mall, S.W. *Act. & Sec.*, R. Todhunter, M.A. .. .. .. P	1825	49/11	65/4	91/5	888,167
Wesleyan & General Assurance Society, Life, Annuities, Sickness, Assurance Buildings, Steelhouse Lane, Birmingham. *Gen. Man.*, A. L. Hunt. London Office, Halton House, 20-23, Holborn, E.C. Further particulars see page 670 .. M	1841	48/1	65/3	93/10	*2,393,815
Yorkshire Insurance Company, Ltd, Chief Offices: St. Helen's Square, York. Bank Buildings, Princes Street, E.C. *London Branches*, 55, Pall Mall, S.W.; 49, Sloane Square, S.W.; 222-225, Strand, W.C.; 132, Newington Crescent, S.E., 43, Broadway, Stratford, S.E. .. .. P	1824	49/1	64/9	91/7	*2,595,435

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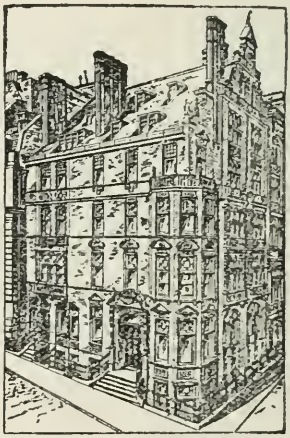

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— THE —

MIDDLESEX HOSPITAL MEDICAL SCHOOL.

(University of London.)

THE Hospital and Medical School are fully equipped for teaching the entire medical curriculum, including instruction in Maternity Wards.

HOSPITAL APPOINTMENTS.

The following Appointments, besides the usual Clerkships and Dresserships, are open to all General Students without extra fee:—

Resident Officers to the Special Departments	2	appointments annually for 6 months.
House Physicians	6	,, ,, ,,
House Surgeons	8	,, ,, ,,
Obstetric and Gynæcological House Surgeons	2	,, ,, ,,

The Medical, Surgical, Obstetric, and Gynæcological Registrars are appointed by the Weekly Board, on the recommendation of the Medical Committee, as vacancies arise (salary £40 a year each).

The Medical and Surgical Casualty Officers are appointed in the same manner (salary £50 a year each, with board and residence).

SCHOLARSHIPS AND PRIZES.*

THREE ENTRANCE SCHOLARSHIPS, of the value of £100, £50, and £25 respectively, and a UNIVERSITY SCHOLARSHIP in Anatomy and Physiology, value of £50, open to Students of Universities of the United Kingdom who have already passed or completed the curriculum for the professional examinations in Anatomy and Physiology, are offered for competition at the commencement of the Winter Session.

TWO BRODERIP SCHOLARSHIPS, of the value of £60 and £40 respectively, are awarded every year for proficiency in Clinical Knowledge.

THE MURRAY GOLD MEDAL AND SCHOLARSHIP (£25), founded in connection with the University of Aberdeen, is awarded every third year to a Student of The Middlesex Hospital.

The following are awarded annually:—

The Hetley Prize, value £25 (Clinical Medicine, Surgery and Obstetrics).
The Lyell Medal and Scholarship, value £55 (Surgical Anatomy and Practical Surgery).
The Leopold Hudson Prize, value 11 guineas (Surgical Pathology and Bacteriology).
The Freeman Scholarship, value £30 (Obstetric Medicine and Gynæcology).
Second Year's Exhibition, value £10 10s. (Anatomy and Physiology).
"Richard Hollins" Research Scholarship, £100.
Salters' Company Cancer Research Scholarship, £100.
Cancer Research Scholarship, £60.
New Zealand Students' Scholarship, the Clinical advantages of the Hospital for One Year Free.

**Certain of these Scholarships have been modified for the period of the War.*

The Tutors assist all Students, especially those who are preparing for Examinations, without extra fee; thus the necessity of obtaining private instruction is obviated.

There is a Gymnasium in the Hospital, and an Athletic Ground within easy Distance.

Full particulars may be obtained on application to—

H. CAMPBELL THOMSON, M.D., F.R.C.P., Dean of the Medical School,
Middlesex Hospital, LONDON, W.

UNIVERSITY of BRISTOL.

FACULTY OF MEDICINE.

THE University affords complete courses of instruction for its own examinations, those of the University of London, and those of the Conjoint Board, etc., for Medical Degrees or Diplomas. The Dental and Public Health Departments afford the necessary instruction for the Degrees and Diplomas of the University and of other examining bodies in those subjects.

The University confers the following Degrees and Diplomas :—

Bachelor of Medicine and Bachelor of Surgery	M.B., Ch.B
Master of Surgery	Ch.M.
Doctor of Medicine	M.D.
Bachelor of Dental Surgery	B.D.S.
Master of Dental Surgery	M.D.S.
Diploma in Dental Surgery	L.D.S.
Diploma in Public Health	D.P.H.

The early part of the curriculum so interlocks with the curriculum for the B.Sc. that the Medical student may without much loss of time take also the degree of B.Sc. Moreover, the Dental student may in seven years take both Dental and Medical degrees. The whole of the Dental Mechanical work for the Bristol Royal Infirmary and the Bristol General Hospital is done in the University laboratory by the students, instructed by skilled mechanics.

CLINICAL WORK is done at the Bristol Royal Infirmary, and the Bristol General Hospital, which together contain over 550 beds. The Bristol Royal Hospital for Sick Children and Women, the Bristol Eye Hospital, the Bristol City and County Asylum, and the Bristol City Fever Hospital are also open for the clinical instruction of students.

SCHOLARSHIPS.—There is no entrance scholarship, but students from the City of Bristol may, on their merits, receive financial aid from the City Scholarship Fund on application to the City Scholarship Committee.

Several Scholarships and Prizes are open to students during their Hospital career.

HOSPITAL APPOINTMENTS open to students after qualification.

At the Bristol Royal Infirmary.—Two House Surgeons, two House Physicians (of these one is chosen as Senior Resident Officer), one Resident Obstetric Officer, one Throat, Nose and Ear House Surgeon, one Ophthalmic House Surgeon, one Casualty Officer, and one Dental House Surgeon.

At the Bristol General Hospital.—One Senior House Surgeon, one Casualty House Surgeon, two House Physicians, one House Surgeon, and one Dental House Surgeon. All these appointments are salaried, with board and residence.

For further particulars and prospectus apply to the Dean of the Faculty of Medicine, or to the Registrar.

UNIVERSITY OF DURHAM

COLLEGE OF MEDICINE, NEWCASTLE-ON-TYNE.

DEGREES IN MEDICINE, SURGERY AND HYGIENE; DIPLOMAS IN PUBLIC HEALTH AND PSYCHIATRY, AND LICENCE IN DENTAL SURGERY.—Six Degrees, two Diplomas, and one Licence are conferred by the University of Durham—*viz.*, the Degrees of Bachelor of Medicine, Doctor of Medicine, Bachelor of Surgery, and Master of Surgery; Bachelor of Hygiene, and Doctor of Hygiene; the Diplomas in Public Health and Psychiatry, and the Licence in Dental Surgery. These Degrees, etc., are open to Men and Women.

Attendance at the University of Durham College of Medicine during one of the five years of professional study, or subsequently to qualification elsewhere, is required as part of the curriculum for the Degrees, except in the case of Practitioners of more than fifteen years' standing, who, having attained the age of forty years, can obtain the Degree of M.D. after examination only.

The first three Examinations for the Degree of M.B. may be passed prior to the commencement of attendance at Newcastle.

A candidate who has passed the First and Second Examinations of the University will be exempt from the First and Second Examinations of the Conjoint Board in England, and will be entitled to present himself for the Final Examination of the Board on the completion of the necessary curriculum. Students who have satisfied the requirements of the General Medical Council as regards Registration, in some Examination other than the Durham Matriculation, or its equivalent, may enter on a course of study for a degree in Medicine upon satisfying the Examiners of the University of Durham in *three* of the subjects of the Matriculation Examination (exclusive of Religious Instruction and Elementary Mathematics), provided that one of them is a language other than English. In the case of a Student who spends only one year at Newcastle, the necessary subjects of the Matriculation Examination must be passed at least 12 months previously to the candidate's entry for his Final Examination for the Degree.

Students can complete, at the University of Durham College of Medicine, Newcastle-upon-Tyne, the entire course of professional study required for the above degrees and for the Diplomas in Public Health and Psychiatry; also for the examinations of the Royal Colleges of Physicians and Surgeons, and for the Army and Navy Examination Boards.

A Dental curriculum is provided, and a Licence in Dental Surgery may be obtained after Examination.

All information, together with Examination Papers, etc., is given in the Calendar of the University of Durham College of Medicine, Newcastle-on-Tyne, which may be obtained gratis from the Secretary at the College.

Scholarships, &c.—University of Durham Scholarship, value £100 for proficiency in Arts, awarded annually to full students in their first year only. The Pears Scholarship value £150—for proficiency in Arts. Dickinson Scholarship—value the interest of £400, and a Gold Medal—for Medicine, Surgery, Midwifery, and Pathology. Tulloch Scholarship—value the interest of £400—for Anatomy, Biology, Chemistry, and Physics. Charlton Scholarship—value the interest of £700—for Medicine. Gibb Scholarship—value the interest of £500—for Pathology. Luke Armstrong Scholarship—interest on £680—for comparative Pathology. Stephen Scott Scholarship—interest on £1000—for promoting the study of Surgery and allied subjects. Heath Scholarship—the late George Yeoman Heath, M.D., M.B., D.C.L., F.R.C.S., President of the University of Durham College of Medicine, bequeathed the sum of £4000 to found a Scholarship in Surgery, the interest to be awarded every second year. Gibson Prize—value the interest of £250 Stock—for Midwifery and Diseases of Women and Children. The Turnbull Prize and Medal—for Surface Anatomy. The Outterson Wood Prize—value the interest of £250—for Psychological Medicine. The Goyder Memorial Scholarship (at the Infirmary)—value the interest of £325—for Clinical Medicine and Clinical Surgery. At the end of each Session, a Prize of Books is awarded in each of the regular Classes. Assistant Demonstrators of Anatomy, Prosectors, and Assistant Physiologists are elected yearly. Pathological Assistants, Assistants to the Dental Surgeon, Assistants in the Eye Department, Clinical Clerks and Dressers are appointed every three months.

The Royal Victoria Infirmary contains over 400 beds. Clinical Lectures are delivered by the Physicians and Surgeons in rotation. Pathological Demonstrations are given as opportunity offers, by the Pathologist; Practical Midwifery can be studied at the Newcastle Maternity Hospital, where there is an out-door practice of over 1000 cases annually.

FEES.

(*a*) A Composition Ticket for Lectures at the College may be obtained—

I.—By payment of 80 guineas on entrance.

II.—By payment of 50 guineas at the commencement of the First Year, and 40 guineas at the commencement of the Second Year.

III.—By three annual instalments of 40, 33, and 22 guineas respectively, at the commencement of the Sessional year.

(*b*) Fees for attendance on Hospital Practice:—

For 3 Months' Medical and Surgical Practice, £6 6s. For 6 months', £10 10s. For 1 year's, £15 15s. For Perpetual, £36 15s.

Or by two instalments—First year, 20 guineas; Second year, 18 guineas.

In addition to the above fees, the Committee of the Royal Victoria Infirmary require the payment of 2 guineas yearly up to three years from every Student attending the Infirmary. For six months, or any shorter period, this fee is 1 guinea. After three years of attendance, such payment will be no longer necessary.

(*c*) Single courses of Lectures, 5 guineas.

(*d*) A Composition Ticket for the courses of Lectures and Practical work of the first two years of the curriculum, may be obtained by the payment of 42 guineas on entrance.

(*e*) Composition fee for Lectures, etc., at College for Licence in Dental Surgery, 40 guineas; Composition fee for Practical work at Dental Hospital, 43 guineas.

(*f*) Composition fee for courses of instruction for the Diploma in Psychiatry, 25 guineas.

Fees for Lectures, etc., at the College and for Hospital Practice, must be paid to the Secretary; and fees for Practical Dental Work to the Dean of the Dental Hospital—at the time of entry.

Further particulars may be obtained from the Sec., PROF. HOWDEN, at the College.

ROYAL INFIRMARY
EDINBURGH.

IN this Hospital (with 921 beds and 42 cots) Clinical Instruction is given by all the Physicians and Surgeons on the Staff. Three wards are specially set apart for the instruction of Women Students. Special Instruction is given in the Medical Department on the Diseases of Women, Physical Diagnosis, and Diseases of the Skin; and in the Surgical Department on Diseases of the Eye, the Ear, and the Larynx, and in Dental Surgery. Separate Wards are devoted to Venereal Diseases, Diseases of Women, and Diseases of the Eye, the Ear, and Throat, and the Skin; also to cases of Incidental Delirium or Insanity. Post-mortem Examinations are conducted in the Anatomical Theatre by the Pathologist, who also gives practical Instruction in Pathological Anatomy and Histology.

MEDICAL DEPARTMENT.

Consulting Physicians—SIR JAMES AFFLECK, DR. ALEXANDER JAMES, DR. BYROM BRAMWELL, EMER.-PROF. W. S. GREENFIELD.

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Assistant Physicians—DR. CHALMERS WATSON, DR. EDWIN BRAMWELL, DR. EDWIN MATTHEW, *DR. W. J. RITCHIE, *DR. JOHN EASON, *DR. JOHN D. COMRIE, DR. ALEX. GOODALL, Lecturers in Clinical Medicine, Edinburgh University. One Vacancy.

Temporary Assistant Physician—DR. J. G. CATTANACH.

SURGICAL DEPARTMENT.

Consulting Surgeons—MR. A. G. MILLER, DR. C. W. MACGILLIVRAY, EMER.-PROF. JOHN CHIENE, C.B., MR. J. M. COTTERILL.

Extra Surgeon—MR. C. W. CATHCART.

Surgeons—*MR. F. M. CAIRD, Regius Prof. of Clinical Surgery, Edinburgh Univ.; MR. J. W. B. HODSDON, MR. DAVID WALLACE, Senior Lecturers in Clinical Surgery, Edinburgh Univ.; MR. ALEXIS THOMSON, Prof. of Systematic Surgery, Edinburgh Univ.: MR. ALEXANDER MILES, MR. JOHN W. DOWDEN, Senior Lecturers in Clinical Surgery, Edin. Univ.; MR. A. A. SCOT SKIRVING.

Assistant Surgeons—MR. GEORGE CHIENE, *MR. W. J. STUART, *MR. J. W. STRUTHERS, *MR. HENRY WADE, *MR. D. P. D. WILKIE, *MR. DENIS COTTERILL, Lecturers in Clinical Surgery, Edinburgh University. Three Vacancies.

Temporary Assistant Surgeons—MR. W. W. CABLOW, MR. J. M. GRAHAM, MR. F. E. JARDINE, MR. W. Q. WOOD.

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Gynæcologists—DR. A. H. F. BARBOUR, MR. N. T. BREWIS, Lecturers in Clinical Gynæcology, Edinburgh University.

Assistant Gynæcologists—DR. J. HAIG FERGUSON, DR. WILLIAM FORDYCE, Lecturers in Clinical Gynæcology, Edinburgh University.

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Assistant Physician—DR. R. CRANSTON LOW.

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Assistant Surgeons—*DR. A. H. H. SINCLAIR, DR. H. M. TRAQUAIR.

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Surgeons—DR. A. LOGAN TURNER, DR. J. MALCOLM FARQUHARSON, Lectrs. in Ear & Throat Diseases.

Assistant Surgeons—DR. JOHN S. FRASER, *DR. JOHN D. LITHGOW.

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Extra Medical Electrician *(for Radium Cases)*—DR. DAWSON TURNER.

Medical Electricians—DR. W. HOPE FOWLER, DR. ARCHIBALD M'KENDRICK.

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Pathologist—PROFESSOR LORRAIN SMITH. **Clinical Pathologist**—MISS FITZGERALD.

Assistant Pathologists—DR. JAMES MILLER, DR. J. W. DAWSON.

Superintendent—*LIEUT.-COL. SIR JOSEPH FAYRER, Bart., M.D., F.R.C.S.E.

Acting Superintendent—WILLIAM S. CAW.

HOSPITAL TICKETS.—Perpetual Ticket, in one payment, £12; Annual Ticket, £6 6s.; Six Months, £4 4s.; Three Months, £2 2s.: One Month, £1 1s. Separate payments, amounting to £12 12s., entitle the Student to a Perpetual Ticket on production of previous Season Tickets.

APPOINTMENTS.

No fees are charged for any Medical or Surgical Appointments in this Hospital, which are as follows:

1. Resident Physicians and Surgeons, who must be registered as legally qualified Practitioners, are from time to time appointed by the Managers on the recommendation of the Physicians and Surgeons. The holders of these offices live in the house free of charge. The appointment is for six months, but may be renewed at the end of that period by special recommendation.
2. Non.-Resident House Physicians and Surgeons and Clinical Assistants, who must also be registered as legally qualified Practitioners, are appointed by the Managers on the recommendation of the Physicians and Surgeons. The appointment is on the same terms as that of the Resident Physicians and Surgeons.
3. Clerks and Dressers are appointed by the Physicians and Surgeons. These appointments are open to all Students and Junior Practitioners holding Hospital Tickets.

Assistants in the Pathological Department are appointed by the Pathologist.

WILLIAM S. CAW, *Treasurer and Clerk.*

* Absent on National Service.

ST. ANDREWS UNIVERSITY

FACULTY OF MEDICINE.

The SESSION 1916-17, commenced Monday, October 9th, 1916.

THE University confers the Degrees of Bachelor of Medicine and Bachelor of Surgery, Doctor of Medicine and Master of Surgery, a Diploma in Public Health, and a Diploma in Dental Surgery. The whole curriculum may be taken at Dundee, or the first two years of the Course may be taken in St. Andrews, and the remaining three years in Dundee. The Medical Buildings and Laboratories, both at St. Andrews and Dundee, have been recently built, and are fully equipped in all departments for teaching and for research.

Clinical Instruction is given at the Dundee Royal Infirmary, which has 400 beds with special wards for Maternity cases, Diseases of Women, Diseases of Children, Diseases of the Eye, Diseases of the Ear, Throat and Nose, Diseases of the Skin, Cancer, and for cases requiring electrical treatment. Further instruction in Diseases of the Eye is given at the Dundee Eye Institution; Clinical Instruction in Fevers is given at the Municipal Fever Hospital; and Clinical Instruction in Mental Diseases at the Dundee District Asylum. The Dundee Dental Hospital provides for Dental students.

Appointments.—Six Resident Medical Assistants and an Out-door Obstetric Assistant are appointed annually at the Dundee Royal Infirmary. At the District Asylum the appointments include two qualified Resident Medical Assistants and two Resident Clinical Assistants.

Bursaries.—At the United College, St. Andrews, ten Taylour-Thomson Entrance Bursaries for Women, of the annual value of from £15 to £25 each—tenable for three years—preference to Women Medical Students. One Malcolm Bursary of the value of £25, tenable by men or women (entrants), for five years. Additional Bursaries (twenty for men and six for women students), ranging in value from £50 to £10, are open to Entrant Students of Medicine, Arts or Science. All these Bursaries are competed for annually in June. Schednles of application, subjects of examinations, and conditions of tenure may be obtained from the Secretary, and must be returned before 22nd May, 1917. Specimen Examination Papers (6d.) may be had from the Secretary. At University College, Dundee, twelve Entrance Bursaries of the value of £15 each, and fourteen Second and Third Year's Bursaries of the value of £20 and £15 are open to competition. Two Fourth and two Fifth Year's Bursaries of £20 each are open to students who take the complete Curriculum in Dundee. These are all tenable for one year. Other Bursaries, of which the patronage is vested in trustees, are available.

The Fees for the complete Course, exclusive of the Examination Fees, amount to £136 10s.

For further information apply to the Secretary of the University, St. Andrews; or to—

PROF. KYNOCH, DEAN OF THE MEDICAL FACULTY.

ST. ANDREWS UNIVERSITY, *August*, 1916.

Royal College of Surgeons of Edinburgh

FOUNDED 1505.

Copies of the Regulations for the Fellowship, Licence, and Licence in Dental Surgery, with dates of Examinations, Curricula, etc., for the year 1917, are now ready, and may be had on application to—

D. L. EADIE, 50 GEORGE SQUARE, EDINBURGH, *Clerk to the College*.

UNIVERSITY of ABERDEEN

Founded 1494.

FACULTY OF MEDICINE.

THE Degrees in medicine granted by the University are—Bachelor of Medicine, Bachelor of Surgery, Doctor of Medicine, and Master of Surgery. They are conferred only after Examination, and only on Students of the University. Women are admitted to instruction and graduation on the same footing as men. A Diploma in Public Health is conferred after Examination on Graduates in Medicine of any University in the United Kingdom.

The Faculty of Medicine embraces twelve chairs, from which instruction is given in all the main branches of Medical Science.

Practical Classes in connection with these chairs are conducted by the Professors and Assistants in Laboratories furnished with all the necessary appliances; and opportunities are afforded to Students and Graduates to extend their practical knowledge and engage in original research.

Instruction is also given in special departments of Medical Practice by Lecturers appointed by the University Court.

Clinical instruction is obtained in the Royal Infirmary, Royal Lunatic Asylum, the Sick Children's Hospital, the City (Fever) Hospital, the General Dispensary, Maternity Hospital and Vaccine Institutions, and the Ophthalmic Institutions.

Bursaries, Scholarships, Fellowships and Prizes, to the number of **50** and of the Annual Value of **£1183**, may be held by Students in this Faculty.

The cost of Matriculation, Class and Hospital Fees for the whole curriculum, inclusive of the fees for the Degrees, is usually about **£160**.

A Prospectus of the Classes, Fees, &c., may be had on application to the Secretary of the Faculty of Medicine.

THEODORE SHENNAN, M.D., F.R.C.S.E., *Dean of Medical Faculty*.

. . THE . .

UNIVERSITY OF LIVERPOOL

FACULTY OF MEDICINE.

The University grants degrees in Medicine, Surgery, Hygiene, Dental Surgery, and Veterinary Science, and Diplomas in Public Health, Tropical Medicine, Dental Surgery, Veterinary Hygiene, Anatomy, Bacteriology, Bio-chemistry and Parasitology.

Students may also prepare in the University for the examinations of other licensing bodies.

Medical School Buildings.—The buildings of the Medical School are all modern, and contain spacious lecture rooms, and well-equipped laboratories and class-rooms for the study of all the more important subjects which form the basis of medicine. In addition, laboratories are provided for medical research in Bio-chemistry, Tropical Medicine, Physiology, Pathology, and Bacteriology.

Hospitals.—The Clinical School consists of four general hospitals—the Royal Infirmary, the David Lewis Northern Hospital, the Royal Southern Hospital, and the Stanley Hospital; and of five special hospitals; the Eye and Ear Infirmary, the Hospital for Women, the Infirmary for Children, St. Paul's Eye Hospital, and St. George's Hospital for Skin Diseases. These hospitals contain in all a total of over 1140 beds.

Fellowships and Scholarships.—Fellowships, Scholarships, and prizes of over £900 are awarded annually. There are also numerous Entrance Scholarships. Particulars may be obtained on application.

The following Prospectuses may be obtained on application to the Registrar:—Medical Faculty, School of Tropical Medicine, School of Dental Surgery, and School of Veterinary Science.

J. M. BEATTIE, M.A., M.D., Dean.

UNIVERSITY OF MANCHESTER

FACULTY OF MEDICINE.

CURRICULUM.—Complete Courses of Instruction are offered to Students (Men and Women) preparing for Degrees in Medicine and Surgery, and in Science, for Degrees and Diplomas in Public Health and Dentistry, and for Diplomas in Veterinary State Medicine, Psychological Medicine and Pharmacy, and for the Qualifications of the Conjoint Board and other Licensing Bodies.

The University contains spacious and well-equipped Laboratories and Museums in all departments of Science and Medicine. For Women Students a separate Laboratory for Practical Anatomy and Special Common Rooms are provided.

Particulars concerning the Medical Faculty and the following Departments: Dental, Public Health, and Pharmaceutical, will be forwarded on application to THE REGISTRAR.

HOSPITAL for CONSUMPTION & DISEASES OF THE CHEST, Brompton

and SANATORIUM at FRIMLEY.

Students and qualified men are admitted to the Practice of the Hospital and the Lectures on payment of a Fee of One Guinea for One Month; Two Guineas for Three Months; Five Guineas for Perpetual Ticket. Clinical Assistants to the Out-Patient Department are appointed for Six Months. Lectures and Demonstrations are given on Wednesdays at 4.30 p.m., the days and subjects being advertised in the Weekly Journals. They are free to qualified practitioners. The Hospital is recognized as a place of study for Students in their Fifth year, and certificates of attendance are accepted also by the University of London, the Apothecaries' Society, and by the Army, Navy, and Indian Board. Full particulars can be obtained from the Dean, as well as forms of application for appointments.

CECIL WALL, *Dean*

The Hospital for Sick Children

GREAT ORMOND STREET, W.C.

Clinical Instruction is given daily by Members of the Visiting Staff in the Wards, Out-patient Department, Operating Theatre and Post-mortem Room.

Clinical Clerkships in the Wards and Clinical Assistantships in the Out-patient Department are also available for Students and Post-Graduates.

During each Session, Classes are held on Special Subjects, by Members of the Staff, Fee for a course of Six Meetings, **£1 1s.**

Fees for Hospital Attendances :—One Month's Ticket, **£2 2s.** Three Months' Ticket, **£5 5s.** Perpetual Ticket, **£10 10s.**

Special Reduced fee for Clinical Clerks for 3 months, **£1 1s.**

On Tuesdays and Fridays, from 5.15 to 6.15, a special Course of Instruction in the Surgical Diseases of Children is given throughout the year. Fee for 8 attendances, **£1 1s.**

Pathological Clerkships.—Facilities are afforded for obtaining Theoretical and Practical Instruction in Clinical Pathology and Bacteriology in the Pathological Laboratories. Clerks attend for about four hours daily. Fees :— For 1 month, **£3 3s.** For 2 months, **£5 5s.** For 3 months, **£6 6s.**

A reduction is made in the case of those already holding tickets for general attendance at the Hospital.

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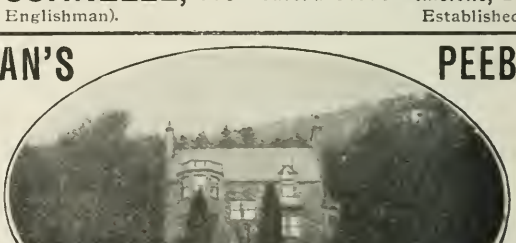

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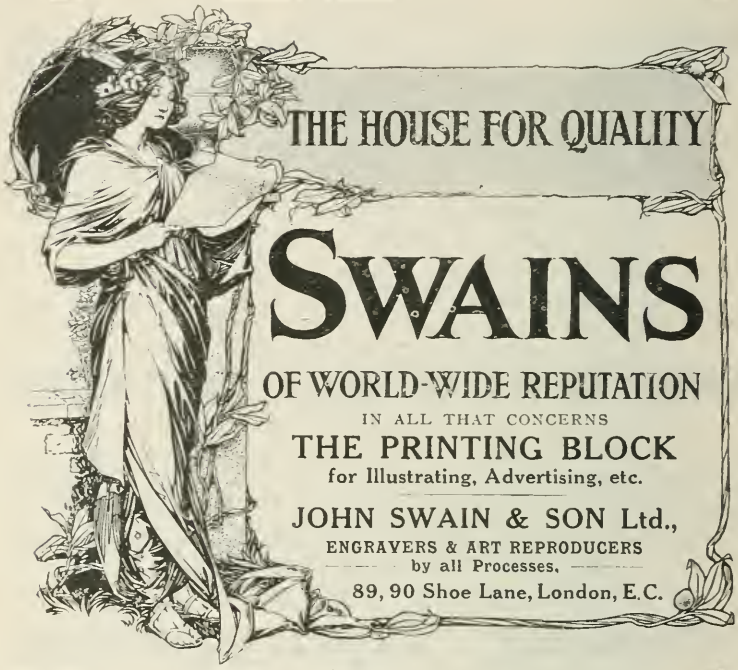

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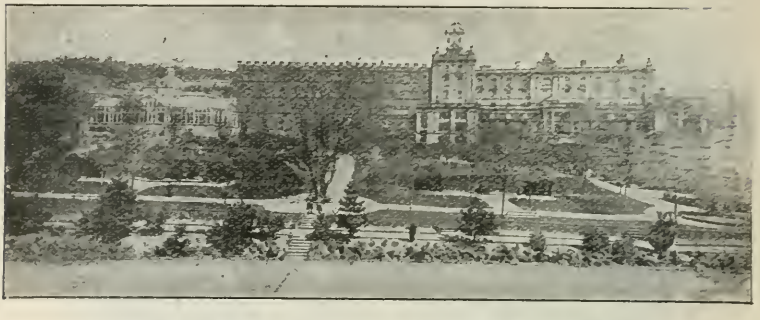

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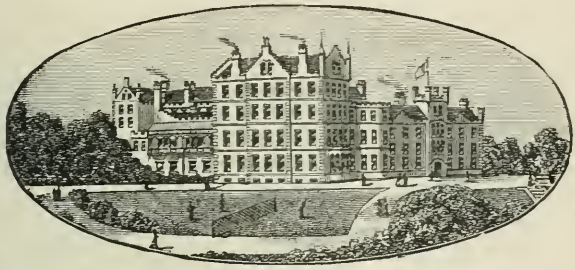

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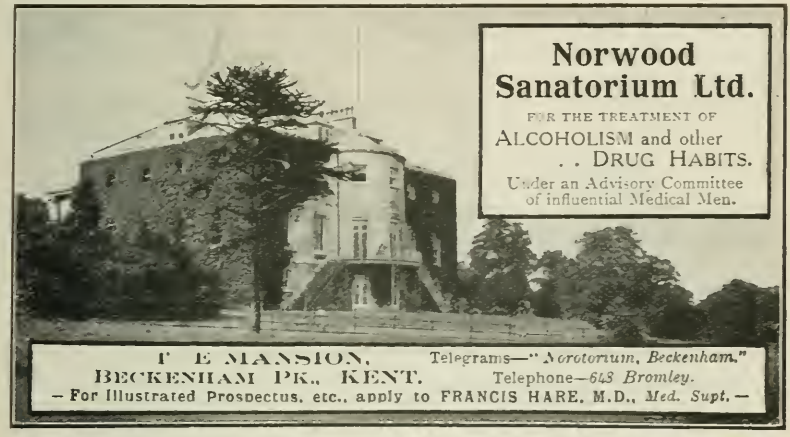

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Dr. MOULD at Winter's Buildings, St. Ann's St., Manchester, Tuesday and Thursday, 12.30 to 1.30.

Hendon Grove, Hendon, N.W.

A private Home, licensed by the Board of Control for the reception of 14 ladies suffering from mental and nervous affections. The Home (which stands in its own grounds of 15 acres, 300 ft. above sea level) is easily accessible either by tube to Golder's Green, or by motor-bus from all parts of London, while it is within 5 minutes' walk from Hendon Station on the Midland Railway. Established over 100 years, the Home has been completely modernised, and all the equipment is up-to-date. The house is furnished as a private residence, and the whole surroundings are made as homelike as possible. It is provided with its own dairy and poultry farm, so that all cream, milk, butter, eggs, poultry, vegetables, and fruit are of home produce. Tennis, croquet, motoring, carriage drives, and varied in- and out-door amusements. The fees vary from £5 5s. 0d. per week inclusive. A fully illustrated brochure can be obtained on application to the Resident Medical Officer. 'Phone 764 Finchley.

For the Treatment of Mental Diseases.

SHAFTESBURY HOUSE,

FORMBY-BY-THE-SEA,

Telephone: No. 8 FORMBY. *Near LIVERPOOL.*

THIS HOUSE, specially built and licensed for the **Care and Treatment of a limited number of Ladies and Gentlemen Mentally afflicted,** is delightfully situated near the coast between Liverpool and Southport, so that patients have the benefit of pure bracing sea air, for which Formby is noted. The House is in the country, and stands in several acres of ornamental well-wooded grounds, the surroundings being in every way bright, cheerful and pleasant. All kinds of outdoor and indoor amusements and occupation provided. Voluntary Boarders without certificates admitted.

TERMS MODERATE

Apply MEDICAL SUPERINTENDENT.

Dr. STANLEY GILL and Dr. HAYES GILL may be consulted by appointment at 31 RODNEY STREET, LIVERPOOL, from 2 till 4 p.m. every Monday and Thursday.

St. ANDREW'S HOSPITAL

For MENTAL DISEASES, NORTHAMPTON.

FOR THE UPPER and MIDDLE CLASSES ONLY.

President—THE RIGHT HON. THE EARL SPENCER, K.G.

THIS Registered Hospital is pleasantly situated in 118 acres of park and pleasure grounds. Every facility is provided for cricket, football, hockey, croquet, lawn-tennis, bowls, golf, motoring, boating, and gardening. TERMS ON APPLICATION. Suitable Patients not under Certificates are also received as Voluntary Boarders.

PATIENTS PAYING HIGHER RATES can have Special Attendants, Horses and Carriages, and Private Rooms in Villas in the Hospital Grounds, or at

MOULTON PARK,

a Branch Establishment, two miles from the Hospital, where there is a farm of 473 acres, which supplies the Hospital with meat, milk, and other farm produce.

BRYN-Y-NEUADD HALL, Llanfairfechan, N. Wales.

THE SEASIDE HOUSE OF ST. ANDREW'S HOSPITAL, is beautifully situated in a Park of 331 acres, close to the Sea, and in the midst of the finest scenery in North Wales. Patients can enjoy good cricket, lawn-tennis, croquet, golf, trout-fishing, and sea bathing. Patients or Boarders may visit this Branch for long or short periods, and can have Private Rooms in Villas in the Park.

FOR PARTICULARS APPLY TO THE MEDICAL SUPERINTENDENT, ST. ANDREW'S HOSPITAL, NORTHAMPTON. Telephone No. 56.

BETHLEM ROYAL HOSPITAL,

Lambeth Road, LONDON, S.E.

For the Reception and Treatment of Cases of Nervous and Mental Disease.

President—Alderman Col. Sir Charles Cheers Wakefield
Treasurer—Lieut.-Col. Alfred James Copeland, F.S.A.
Physician Superintendent—J. G. Porter Phillips, M.D., M.R.C.P.
Assistant Physician—H. Leslie McCarthy, M.D. *Pathologist*—Clement Lovell, M.D.
Temporary Asst. Physicians—F. Wyatt-Smith, M.D.; G. H. Monrad-Krohn, M.B.

CONSULTING STAFF.

Surgeon—Arthur Evans, Esq., M.S., F.R.C.S.
Gynæcologist—Thomas George Stevens, Esq., M.D., F.R.C.S.
Ophthalmologist—J. Francis Cunningham, Esq., F.R.C.S.
Laryngologist, etc.—W. Mayhew Mollison, Esq., F.R.C.S.
Anæsthetist—Cecil M. Hughes, Esq., M.B., B.S.
Dentist—Fredk. Todd, Esq., M.R.C.S., L.D.S.

PATIENTS of the Educated Classes, in a presumably Curable condition, are alone eligible for Admission, and may be received either **Free,** or on payment of a fixed inclusive rate of **2 guineas** per week. With a view to the early treatment of Eligible cases **Voluntary or Uncertified** Patients are admitted.

The following are NOT eligible:
1. Those who have been Insane more than twelve months, and are considered by the Medical Superintendent to be incurable.
2. Those who are in a state of Idiocy, or subject to Epileptic Fits.
3. Those whose condition either threatens speedy dissolution of life or requires the permanent and exclusive attention of a nurse.

In connection with this Hospital, there is a **CONVALESCENT HOME** on the Surrey Hills at **WITLEY.**

For Forms or further particulars, apply to the Physician Superintendent,
J. G. PORTER PHILLIPS, M.D., M.R.C.P.

THE COPPICE, NOTTINGHAM,

HOSPITAL FOR MENTAL DISEASES.

President—The Right Hon. EARL MANVERS.

This Institution for the reception of **Private Patients** of both sexes of the **Upper and Middle Classes** only, at moderate rates of payment, is beautifully situated in its own grounds about two miles from Nottingham, and from its singularly healthy and pleasant position, and the comfort of its internal arrangements, affords every facility for the relief and cure of those mentally afflicted. Divine Service is held in the Institution every Sunday by the Chaplain, who also visits the Patients. Carriage and motor exercise is provided.

FOR TERMS, ETC., APPLY TO

DR. HUNTER, *Physician-Superintendent.*

ESTABLISHED 1824.

The Retreat Private Asylum,

NEAR ARMAGH.

For the CURE and TREATMENT of Ladies and Gentlemen of the Upper and Middle Classes suffering from

MENTAL AND NERVOUS DISEASES.

Voluntary Boarders and Inebriates admitted without Medical Certificates.

This Retreat is beautifully situated in picturesque grounds of 150 acres, and Patients enjoy the greatest possible liberty. There is a large percentage of Recoveries on recent admissions.

For particulars apply to the Resident Medical Superintendent,
Dr. J. GOWER ALLEN, J.P.

STRETTON HOUSE,

CHURCH STRETTON, SHROPSHIRE.

A Private Licensed House for the treatment of Gentlemen suffering from Nervous or Mental Diseases.

ESTABLISHED 1853.

SITUATED amongst charming scenery, more than 600 feet above the sea, large grounds, pure water, perfect sanitation, and enjoying the bracing air of the "English Highlands."

Easily accessible from all parts. Good train services on G.W. and L. & N.W. Railways.

Congenial occupation and recreation are specially attended to, and all sorts of indoor and outdoor amusements are provided.

Patients have carriage exercise and daily walks amongst the beautiful mountain scenery.

For Terms and further information, apply to—

THE MEDICAL SUPERINTENDENT.

Telegrams: "Stretton House, Church Stretton." ☼ Telephone: 10, Church Stretton.

KINGSDOWN HOUSE,

BOX (Near BATH).

Telephone: No. 2 Box.

LICENSED FOR THE TREATMENT OF DISEASES OF THE BRAIN AND NERVOUS SYSTEM.

THIS House is situate 450 feet above sea level, and commands extensive views of the surrounding country.

Access—Box Station (G.W.R.); Bath Stations (Midland and G.W.R.) twenty minutes from the house.

For terms apply to—

Dr. H. C. MacBRYAN, *Resident Proprietor & Medical Superintendent, at the above,*

Or at 17, BELMONT, BATH. *Telephone:* No. 636, BATH.

BOREATTON PARK

THIS PRIVATE ASYLUM, which was founded by the late W. H. O. SANKEY, M.D., F.R.C.P., for the reception of a limited number of

LADIES & GENTLEMEN MENTALLY AFFLICTED,

—— is now conducted by his son, ——

E. H. O. SANKEY, M.A., M.B., B.C. Cantab.

The Ladies' Division is directly supervised by Mrs. SANKEY.

The Mansion stands high, among handsomely laid out gardens in the midst of a picturesque deer park (about 40 head of deer are kept), and commands a magnificent view of Welsh mountain scenery.

Carriages, horses, motor, lawn-tennis, golf, trout and other fishing are provided.

Arrangements can be made to enable friends of patients to reside in the House as Boarders if so desired.

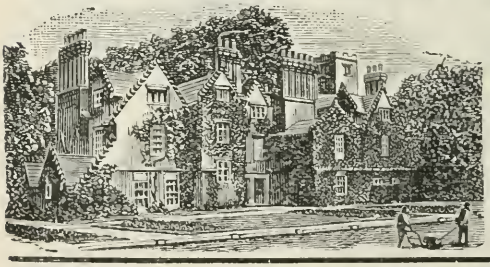
The Asylum is situate about ten miles from Shrewsbury, within easy distance of Baschurch Station, G.W.R., whither carriages can be sent at any time for visitors.

Letters and Telegrams should be addressed to—

Dr. SANKEY, Boreatton Park, Baschurch, SALOP.

THE MOAT HOUSE, TAMWORTH, STAFFS.

STATIONS: L. & N. WEST. & MIDLAND RAILWAYS.



A HOME for NERVOUS and MENTAL CASES.

The House stands in grounds of ten acres (within 5 minutes' drive of either Station), and is devoted to the Care and Treatment of a few Ladies suffering from Nervous and Mental Affections, who enjoy the comfort, privacy, and occupations of home life. Voluntary Patients are received without certificates.

For Terms, etc., apply to the Resident Licensees:

EDWD. HOLLINS, M.A. Cantab.,
or **(Mrs.) S. A. MICHAUX.**

The RETREAT, LANCASTER.

A HOME FOR PRIVATE PATIENTS in detached Villas, in connection with the County Asylum at Lancaster, but quite apart from the pauper department. Private well-furnished sitting rooms and bedrooms can be had on reasonable terms.

Terms from 25 1 per week (3/7 per day) without extras.

APPLY TO THE MEDICAL SUPERINTENDENT.

New Saughton Hall, — POLTON, — MIDLOTHIAN.

PRIVATE HOSPITAL for the Treatment of NERVOUS & MENTAL CASES.

NEW SAUGHTON HALL, which takes the place of Saughton Hall, established in 1798, is situated seven miles south of Edinburgh, in the beautiful neighbourhood of Hawthornden, and Rosslyn, and is surrounded by picturesque and well timbered pleasure grounds extending to 125 acres. There is also a **SEASIDE HOUSE** at **GULLANE, EAST LOTHIAN.**

RAILWAY STATIONS.—Polton five minutes; and Loanhead, ten minutes' walk from the Institution—reached in half-an-hour from the Waverley Station, Edinburgh. *Telephone:* 4 *Loanhead.*

Forms of Admission for Voluntary or Certified Cases, full instructions, etc., can be obtained on application to the Resident Medical Superintendent, **J. BATTY TUKE, M.D., F.R.C.P. Ed.**

Inclusive Terms from £84 to £400 per annum, according to requirements.

BETHEL HOSPITAL

FOR MENTAL DISEASES,

NORWICH.

ESTABLISHED A.D. 1713.

THIS Institution is an endowed Hospital, registered under the Lunacy Acts, and managed by a Board of Governors who have no pecuniary interest in its success, but whose sole object is to promote the comfort and well-being of the Patients. The Hospital is arranged for both sexes.

The terms for admission are Thirty-five shillings per week, or more, according to Patients' condition and circumstances, which includes everything, except clothing, carriage exercise, or any expenses incurred for amusement beyond the Hospital grounds.

CONSULTING PHYSICIAN:
SAMUEL J. BARTON, M.D.
(Senior Physician to the Norfolk and Norwich Hospital).

RESIDENT MEDICAL SUPERINTENDENT:
SAVILLE J. FIELDING, M.B.

CLERK TO THE GOVERNORS:
FRANCIS HORNOR, QUEEN STREET, NORWICH.

MATRON:
MISS OXLEY *(Late Sister Guy's Hospital, London).*

APPLICATION FOR ADMISSION TO BE MADE TO THE

Resident Medical Superintendent, BETHEL HOSPITAL, NORWICH.

SPRINGFIELD HOUSE

NEAR BEDFORD.

(TELEPHONE No. 17. **Within an hour of London by Midland.**)

AN INSTITUTION FOR THE

CARE AND CURE OF THE INSANE.

Under the Personal Direction of the Licensees:

DAVID BOWER, M.D.

(Late Resident Medical Superintendent of Saughton Hall Asylum, Edinburgh;)

MR. W. S. BOWER AND MISS BELLARS.

(ASSISTED BY LADIES' AND GENTLEMEN'S COMPANIONS.)

Ordinary Terms: THREE GUINEAS per Week.

Including separate Bedrooms for all suitable cases.

The PLEASAUNCE, YORK.

Telephone: 184 York. **Old Established MENTAL HOME for LADIES.**

Licensed for 22 Ladies of the Upper & Middle Classes. The House stands in extensive well-wooded Grounds within the boundary of the city.

A special feature is made of the Treatment of Incipient Mental Cases, Certified or Voluntary.

Terms and Prospectus on application to Resident Licensees, **Leonard H. Baugh, M.B.; (Mrs.) Janie S. Baugh, M.B.**

CAMBERWELL HOUSE,

33 PECKHAM ROAD, S.E.

Telegrams: "PSYCHOLIA, LONDON." Telephone: New Cross 1057.

For the Treatment of MENTAL DISORDERS.

Completely detached Villas for Mild Cases. Voluntary Boarders received. 20 acres of grounds. Cricket, tennis, croquet, squash racquets, bowls, and all indoor amusements.

An Illustrated Prospectus, giving full particulars and terms, may be obtained on application to the SECRETARY.

Senior Physician: FRANCIS H. EDWARDS, M.D., M.R.C.P.

HOVE VILLA, BRIGHTON—A Convalescent Branch of the above.

Telegrams: "DICKSON, BUXTON." *National Telephone:* 130. BUXTON.

WYE HOUSE ASYLUM, BUXTON, DERBYSHIRE.

ESTABLISHED IN 1858, FOR THE

CARE and TREATMENT OF THE INSANE of the Higher and Middle Classes.

THE NEW INSTITUTION COMPLETED 1901.

Resident Physicians: GRÆME DICKSON, L.R.C.P. & S. Ed., L.R.F.P.S. Glasg., *Med. Supt.; and* ASSISTANT MEDICAL OFFICERS at Buxton and in N. Wales.

Chaplain: Rev. Canon SCOTT-MONCRIEFF, M.A., D.D. (Vicar of Buxton and Rural Dean).

THIS Institution has been established for the **Reception of Patients of Both Sexes of the Higher and Middle Classes,** for whom it is admirably adapted by its position and appointments. It is erected on an eminence surrounded with scenery of the most varied character, and the views from the House and Terraces extend over many miles of picturesque country. There is also in connection a Summer Residence on the coast of North Wales. The House is furnished throughout on the most liberal scale, and fitted up and arranged as a Gentleman's Family Residence. Voluntary Boarders can be received.

The Sanitary arrangements and Ventilation are modern in design and *perfect* in construction, and are certified to be so by the Sanitary Authority.

The Medical Superintendent lives in the House, and is assisted in his duties by two Assistant Physicians, and an experienced Lady Superintendent.

Every exertion is made to promote health and comfort, both by moderate bodily employment and by variety in amusements, such as reading, music, drawing, excursions, golf, billiards, croquet, lawn tennis, theatricals, re-unions, etc. A library is provided, containing some 2,000 works of varied character, suited to the condition of the patients; also periodicals, magazines, and newspapers. Motor exercise is provided.

Due provision is made for the spiritual welfare and consolation of the Patients, and Divine Service is held every Sunday in the Institution.

The Pleasure Grounds, which are very spacious, have been laid out in the most tasteful manner especially for the recreation of the Patients; and contain conservatories, lawns for croquet and tennis, a private golf course, and other out-door games; also a theatre, two billiard rooms, and workshop for the in-door occupation of Patients. The House is heated throughout by means of hot-water apparatus and open fireplaces.

Buxton is directly accessible by the Midland and the L. & N.W. Railways. It is situated on the mountain limestone formation, 1000 feet above sea level. Being a watering-place, it affords exceptional advantages and varied recreations to convalescent Patients.

Particulars of Terms and Forms of Admission on application to THE MEDICAL SUPERINTENDENT.

Established 1826.

PECKHAM HOUSE,

112, PECKHAM ROAD, LONDON, S.E.

Telegrams: **"Alleviated, London."** *Telephone:* **New Cross 576.**

AN Institution licensed for the **CARE and TREATMENT of the MENTALLY AFFLICTED of both Sexes.** Conveniently situated. Electric trams and omnibuses from the Bridges and West-End pass the House. Private houses with electric light for suitable cases adjoining the Institution. Holiday parties sent to the Seaside branch at Worthing during Summer months.

—Moderate Terms:—

Apply to MEDICAL SUPERINTENDENT for further particulars.

DERBY MENTAL HOSPITAL.

ALBANY HOUSE, a Detached Block for FEMALE PRIVATE PATIENTS.

TERMS: 1½ GUINEAS PER WEEK, which includes everything except clothing. This Villa is distinct from the main building, and has separate recreation grounds.

For further particulars, apply to the Medical Superintendent,

Dr. S. R. MACPHAIL, Rowditch, DERBY.

ESTABLISHED 1814.

NORTHUMBERLAND HOUSE,

GREEN LANES, FINSBURY PARK, N.

Telephone No.: 888 North. Telegrams: "Subsidiary," London.

An INSTITUTION for the Care and Treatment of Ladies & Gentlemen suffering from NERVOUS and MENTAL AFFECTIONS.

Four miles from Charing Cross; nearest Station, Finsbury Park (G.N. and N. London Railways); Tubes to City and West End. Electric Cars from Finsbury Park Station run every few minutes past the gates.

Six acres of ground, highly situated, facing Finsbury Park.

Private Villas, in suites of rooms.

Voluntary Boarders received without certificates.

SEASIDE BRANCH AT WORTHING.

For Terms and other particulars apply to RESIDENT PHYSICIAN.

HOLLOWAY SANATORIUM

VIRGINIA WATER.

A Registered Hospital for the CURE and CARE of the INSANE and of NERVOUS INVALIDS of the MIDDLE and UPPER CLASSES.

THIS Institution is situated in a beautiful and healthy locality, within easy reach of London. It is fitted with every comfort. Patients can have Private Rooms and Special Attendants, as well as the use of General Sitting Rooms, at moderate rates of payment. Voluntary Boarders not under Certificates can be admitted. There is a Branch Establishment at Canford Cliffs, Bournemouth, where Patients and Boarders can be sent for a change, and provided with all the comforts of a well-appointed home.

For Terms, apply to the RESIDENT MEDICAL SUPERINTENDENT,

St. Ann's Heath, Virginia Water, SURREY.

THE RETREAT, YORK. *ESTABLISHED 1792.*

A Registered Hospital for the Treatment of Mental Diseases.

Under the management of a Committee of Members of the Society of Friends. Situated about two miles from York Station. The Patients are derived from the **Upper and Middle Classes,** and none are paupers or rate-aided. **Terms from 63/- weekly.**

Voluntary Boarders are received on their own application.

For further particulars see the Annual Report, which will be sent on application to Dr. BEDFORD PIERCE, the Medical Superintendent. *Nat. Telephone:* **112 York.**

THROXENBY HALL, Near SCARBOROUGH.

A Branch House connected with The Retreat, York, situated near the Raincliffe Woods, about two miles from Scarborough, for the reception of **Convalescent Patients,** also for the treatment of persons suffering from **Incipient or mild forms of Mental Disorder** who cannot be certified as of unsound mind, and who wish voluntarily to place themselves under skilled treatment.—For further particulars apply to the MATRON, THROXENBY HALL, SCARBOROUGH; or to Dr. BEDFORD PIERCE, at THE RETREAT, YORK. *Nat. Telephone:* **282 Scarborough.**

RETREAT TRAINED NURSES DEPARTMENT.

Staffed by Nurses who have been trained for four years in the Retreat, and conducted upon a profit-sharing basis. MENTAL and NERVOUS CASES only undertaken.

TRAINED FEMALE NURSES, £2 12s. 6d. to £3 3s. Weekly. Apply **MATRON, Retreat, YORK.** *Nat. Tel. 112.*

Incorporated by Royal Charter.

JAMES MURRAY'S ROYAL ASYLUM, PERTH.

Chairman—The Rt. Hon. The Earl of Mansfield.

THIS MENTAL HOSPITAL, FOR PRIVATE PATIENTS ONLY, is beautifully situated in the immediate vicinity of Perth, in the midst of extensive Pleasure Grounds, which are surrounded by the fields of the Home Farm.

THE INSTITUTION has been entirely re-organized and enlarged by the addition of *two wings*, for the reception of acute cases, so as to render it an efficient *Hospital* as well as a comfortable *Home*.

The Mansion-House of PITCULLEN, which is quite separate from the Asylum, and THE EAST AND WEST VILLAS, afford the necessary variety of accommodation for modern treatment. SEVEN GABLES, ELIE, the seaside house, is arranged for the reception of those suffering from mild mental disturbance, and for convalescents.

Physician Superintendent: R. DODS BROWN, M.D., F.R.C.P.E. ***Telephone No.:***
Consulting Physician: A. R. URQUHART, M.D., F.R.C.P.E., LL.D. ***104 Perth.***

ASHWOOD HOUSE,

KINGSWINFORD, STAFFORDSHIRE.

An old-established and modernized Institution for the Medical Treatment of Ladies and Gentlemen Mentally Afflicted.

THE House, pleasantly situated, stands in picturesque grounds of forty acres in extent, with a surrounding country noted for the beauty of its walks and drives. The climate is genial and bracing. Occupation, indoor and outdoor amusements, and carriage and other exercise amply provided.

TERMS vary according to requirements as to accommodation, special attendance, etc.

TELEPHONE: 19, KINGSWINFORD.

Railway Stations: Stourbridge Junction (G.W.R.), 3¼ miles; Dudley (L. & N.W.R.), 4 miles; Wolverhampton (G.W.R. or L. & N.W.R.), 7 miles.

FOR FURTHER PARTICULARS APPLY TO THE MEDICAL SUPERINTENDENT.

NORTHWOODS HOUSE,

WINTERBOURNE, near BRISTOL.

A Sanatorium for Ladies and Gentlemen suffering from Nervous and Mental Disorders.

SITUATED in a large Park, 300 feet above sea level, in a healthy and picturesque locality, easily accessible from London, Bristol, and Cardiff by Winterbourne Station; or from Fishponds, Yate, or Patchway Stations.

Voluntary Boarders received without Certificates.

For further information, see London Medical Directory, p. 2049, and for Terms, etc., apply to Dr. J. D. THOMAS, Resident Medical Proprietor, Northwoods House.

DR THOMAS *attends at* 64, *PARK STREET, BRISTOL, on Mondays and Thursdays, from* 12 *to* 1.30 *o'clock.*

TELEPHONE: No. 18 WINTERBOURNE.

BARNWOOD HOUSE,
GLOUCESTER.

A REGISTERED HOSPITAL for PRIVATE PATIENTS Only, of the UPPER and MIDDLE CLASSES.

ARRANGED and furnished with all the most approved appliances for the treatment, comfort, and amusement of the Inmates. Within two miles of the Railway Station, and easily accessible by Rail from London and all parts of the kingdom. It is beautifully situated at the foot of the Cotswold Hills, and stands in its own grounds of 250 acres.

For Terms, etc., apply to JAS. GREIG SOUTAR, M.B., C.M.,
TELEPHONE No. 307. *Resident Superintendent.*

PLYMPTON HOUSE,
PLYMPTON, SOUTH DEVON
ESTABLISHED 1834.

PLYMPTON HOUSE is licensed for the accommodation of both sexes, and is well adapted by its position and appointments for the **Medical Treatment and Care of Patients of the Upper and Middle Classes, suffering from MENTAL DISEASE.**

The proprietors, Dr. ALFRED TURNER and Dr. J. C. NIXON, have had very large experience of Mental cases, both in public and private institutions, and everything that can be done to ameliorate the condition of the chronic, and promote the cure of the acute cases—placed under their charge—is guaranteed.

TERMS ON APPLICATION. *Letters and Telegrams:*
Telephone: No. 2 PLYMPTON. DR. TURNER, PLYMPTON.

OTTO HOUSE,
47, North End Road, WEST KENSINGTON, W.
Telephone: No. 1004 Hammersmith.

A HOME FOR THE CARE AND TREATMENT OF LADIES MENTALLY AFFLICTED.

Apply to MISS BRODIE (Resident Lady Superintendent), *or to*
A. H. SUTHERLAND (Licensed Propr.), 2a Marloes Road, KENSINGTON, W.

"NORMANSFIELD."

A PRIVATE ESTABLISHMENT for the care and training of the **MENTALLY DEFICIENT.**

Patients of either sex, including quite young children, received. Separate houses for the slighter grades of defect.

For particulars apply to the Resident Physician and Proprietor, HAMPTON WICK.

THE WARNEFORD,

HEADINGTON HILL, OXFORD.

A Registered Hospital for the Care & Treatment of both Sexes of the Upper & Middle Classes, when suffering from Nervous and Mental Disorders.

President—THE RIGHT HON. THE EARL OF JERSEY.
Chairman of the Committee—
THE REV. WILLIAM ARCHIBALD SPOONER, D.D., Warden of New College, Oxford.
Vice-Chairman—SURGEON-GENERAL SIR A. FREDERICK BRADSHAW, M.A., K.C.B.

The Regular Charge for Patients is **£2 12s. 6d.** a week, but the Committee have power to alter the charges at their discretion, as the circumstances of cases require.

The building is arranged, so far as is compatible with the requirements of a Mental Hospital, in the manner of an ordinary private residence.

The Hospital possesses an Endowment Fund, arising from numerous grants of the late Dr. SAMUEL WILSON WARNEFORD and others. When a reduction of the ordinary charge is asked, a special statement of the circumstances of the Patient must accompany the application for Admission.

For further particulars, apply to the Medical Superintendent, ALEX. W. NEILL, M.D.

THE GRANGE, Near ROTHERHAM,

A SANATORIUM OF THE HIGHEST CLASS FOR THE

CARE & CURE OF MENTAL INVALIDS (LADIES).

Consulting Physician: CROCHLEY CLAPHAM, M.D., F.R.C.P.E.
Resident Physician: G. E. MOULD, M.R.C.S. Eng., L.R.C.P. Lond.
Physician for Mental Diseases to the Sheffield Royal Hospital.

THE House is a spacious Family Mansion, with extensive pleasure grounds, including good Croquet and Tennis Grounds, and an immense Park, containing Private Drives and Walks of several miles in extent. It is situated in the heart of the famous Robin Hood Country (5 miles from Sheffield, 4 from Rotherham) and is surrounded by beautiful scenery, and an atmosphere free from smoke and impurity. Situation dry and healthy. The arrangements are of a domestic character. The Proprietors welcome visits from the usual Medical Attendant of the Patient during her residence. Under the New Act Voluntary Patients can be received, without Certificates, on own personal application. The Rev. R. T. C. SLADE, Mus. Bac., Vicar of Thorpe-Hesley, acts as Chaplain, and conducts regular Services.

The Resident Physician may be seen at the Grange; or at Leavygreave House, Hounsfield Road, Sheffield, by appointment. **(Nat. Tel. No. 34, Rotherham.)**

GRANGE LANE STATION (M. S. & L. Railway) is within a quarter of a mile of The Grange, and may be reached via Sheffield or Barnsley direct; or via Rotherham, changing at Tinsley.

FOR TERMS, FORMS, &C., APPLY TO THE RESIDENT PHYSICIAN.

CLARENCE LODGE,

CLARENCE ROAD, CLAPHAM PARK.

A LIMITED number of **LADIES** suffering from **MENTAL** and **NERVOUS DISORDERS** are received for treatment under a Specialist. The House stands in large grounds.

For further Particulars see Illustrated Prospectus from the Proprietress,
Telephone: 494 Brixton. **MRS. THWAITES.**

CORPORATION MENTAL HOSPITAL

PORTSMOUTH.

ACCOMMODATION is provided for LADIES and GENTLEMEN in TWO DETACHED VILLAS, very pleasantly situated, at a charge from **£1 11s. 6d.** upwards, including all necessaries except clothing.

APPLY .. .. MEDICAL SUPERINTENDENT.

STOKE PARK COLONY

For Mentally Defective Children,
STAPLETON,
BRISTOL.

Apply to Secretary—**The Incorporation of National Institutions for Persons requiring Care and Control, 14 Howick Place, Westminster, S.W.**

Telephone: 3045, Victoria. *Telegrams:* "Burdensome, London."

HOME FOR FEEBLE-MINDED,

THE ROYAL ALBERT INSTITUTION, LANCASTER.

The ROYAL ALBERT INSTITUTION is a Home for the Care, Education and Training of the IMPROVABLE FEEBLE-MINDED, with accommodation for 750 cases.

Terms: 1. FREE PATIENTS, between the ages of Six and Fifteen, whose friends cannot meet the lowest payment of 25 Guineas per annum.

2. PAYING PATIENTS, admitted by the Central Committee without Election and at any time. The charges vary from 25 to 200 Guineas per annum.

BRUNTON HOUSE (For Private Pupils).

BRUNTON HOUSE combines the comforts of a Private Home with all the advantages of a large Public Institution under responsible management. It possesses extensive gardens and grounds, which include tennis and croquet lawns. Individual attention is given to the pupils by an experienced Staff, under a Medical Superintendent and Lady Matron. SAMUEL KEIR, *General Secretary.*

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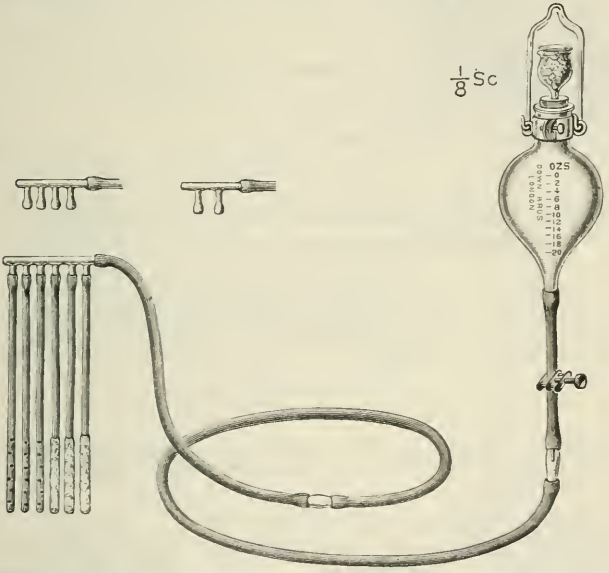

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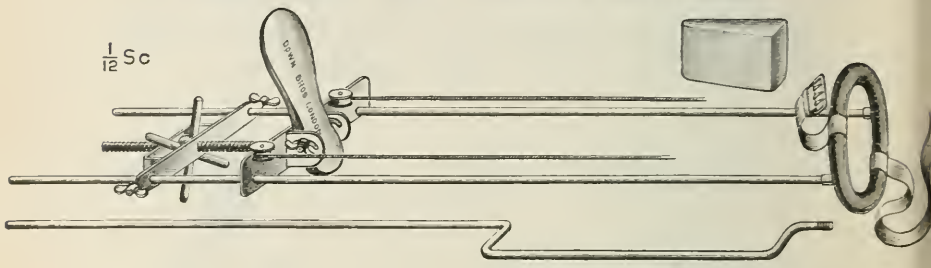

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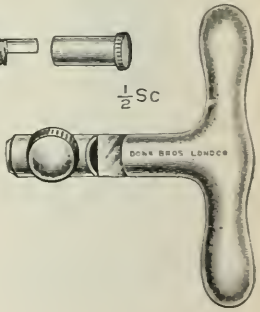

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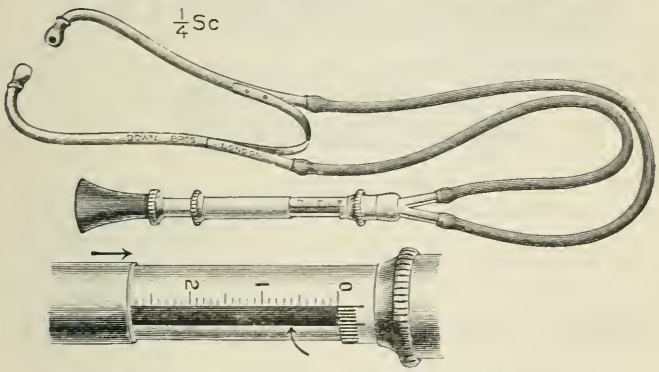

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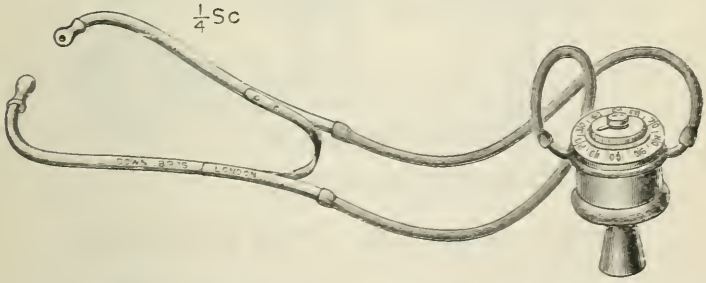

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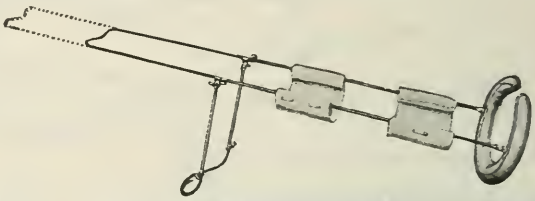

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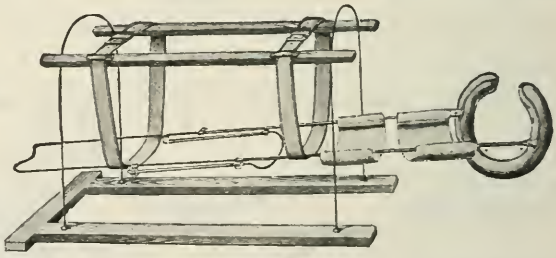

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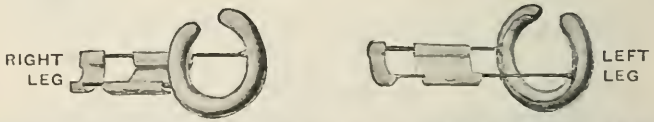

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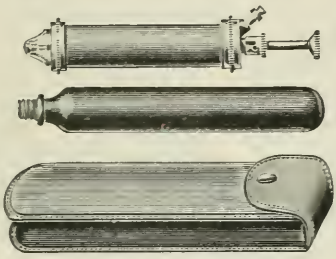

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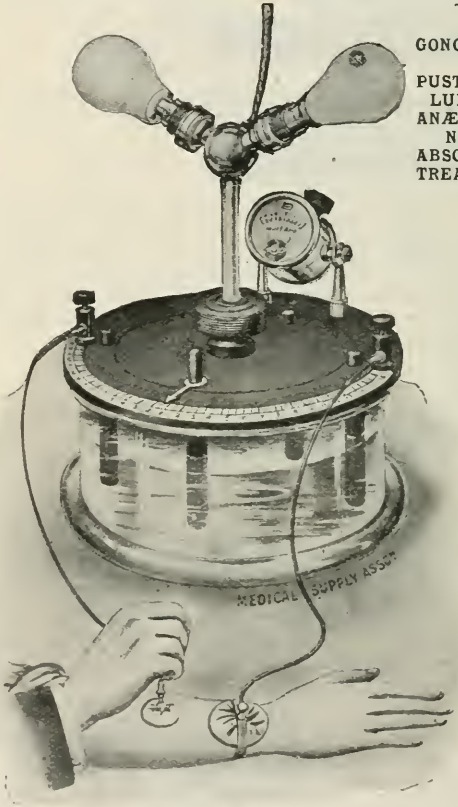

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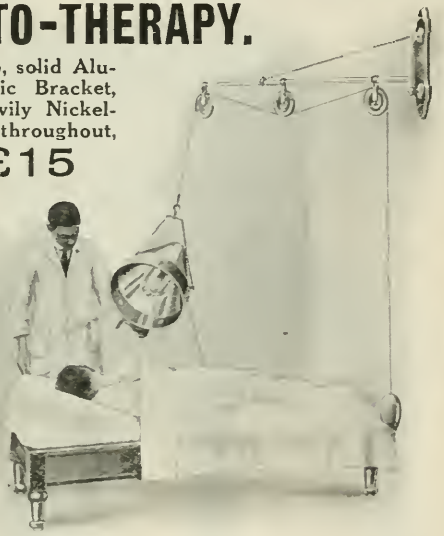

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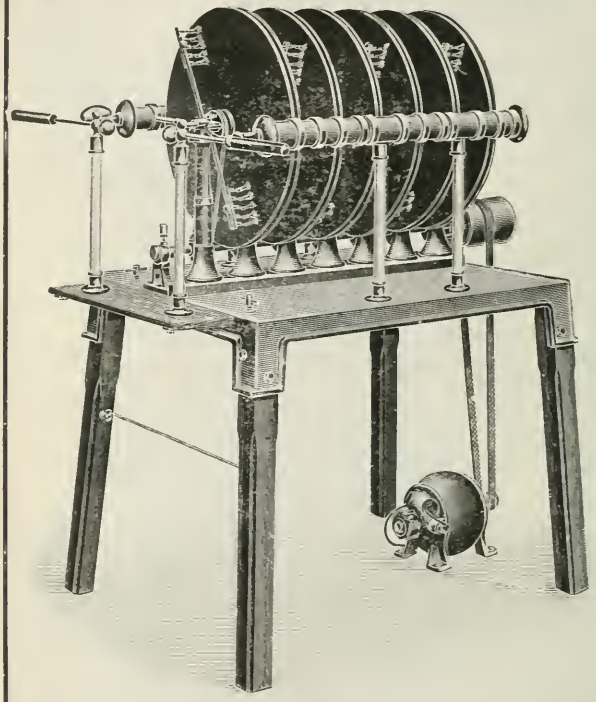

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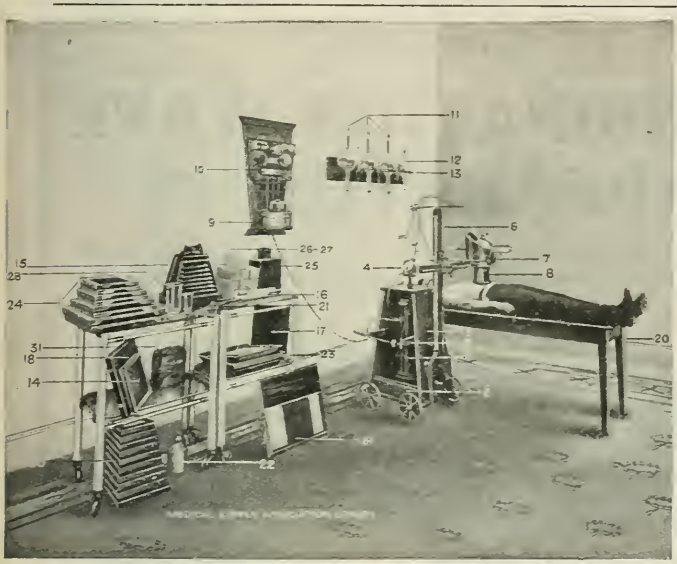

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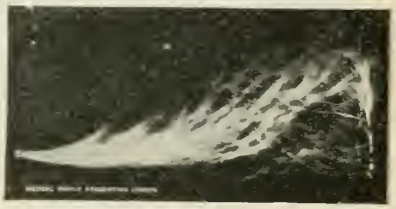

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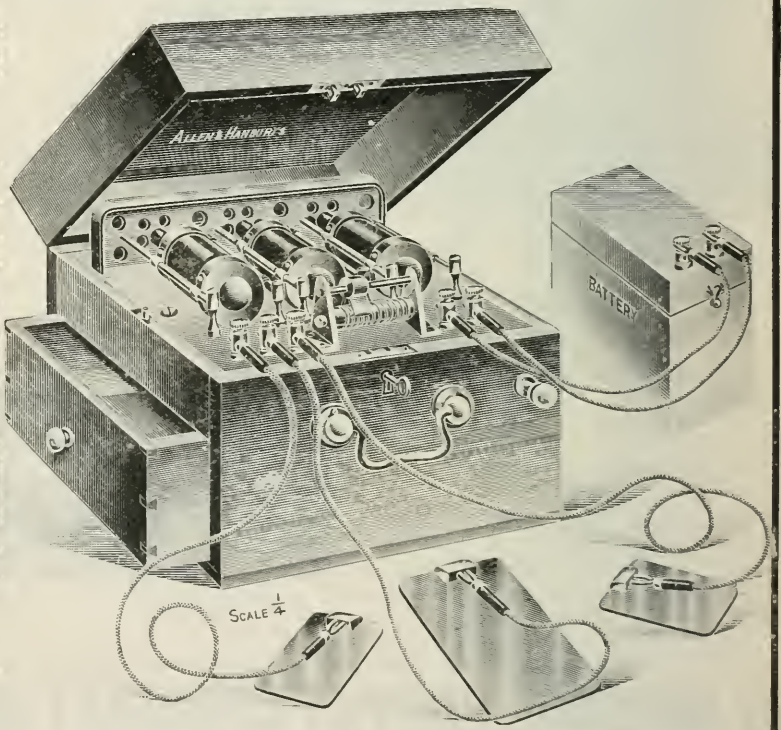

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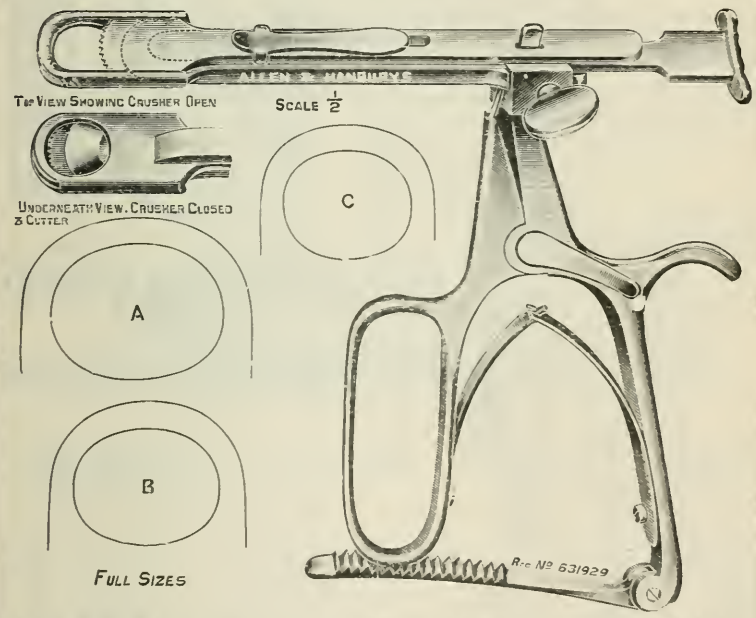

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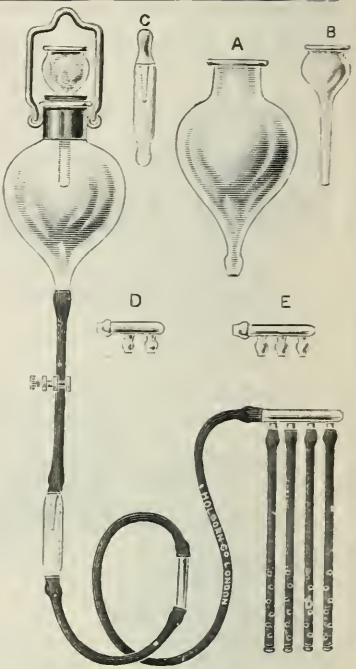

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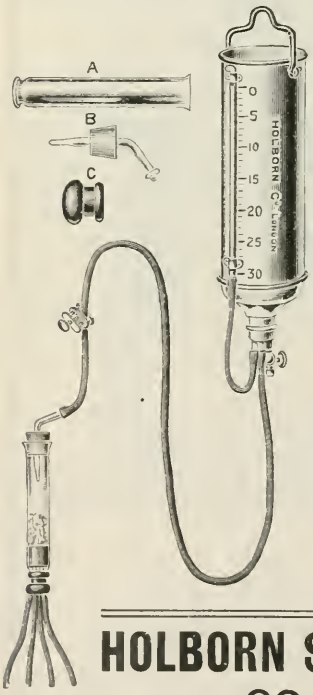

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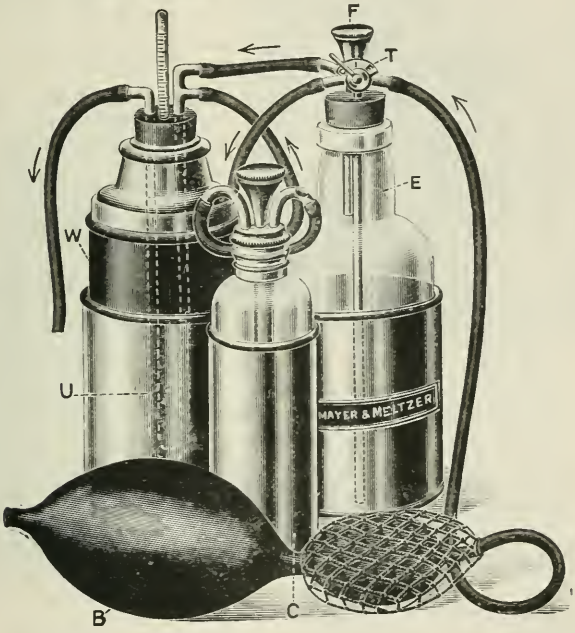

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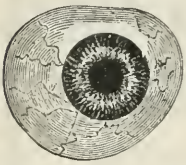

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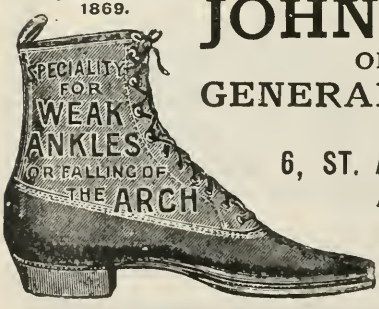

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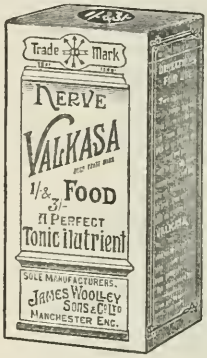

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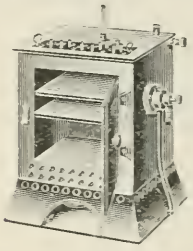

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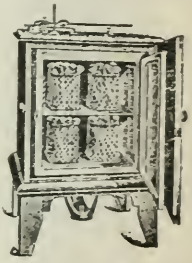

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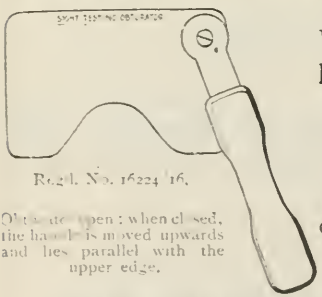

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